APPENDIX G

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APPENDIX G

Strategy of Anti-Smoking Groups

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Strategy of Anti-Smoking Groups

A. Introduction

PM USA loses far more consumers through quitting than it does through switching to competitors' brands. Though it cannot be definitively proven, it is a reasonable assumption that a significant cause for individuals to quit is the anti-smoking movement. As a consequence, these groups must be considered competitors. It is therefore important to attempt to understand the broad strategies of these groups in order to determine those threats or opportunities which may exist through their future actions that are of relevance to PM USA R&D. Unlike our other competitors, anti-smoking groups are more than willing to share their strategic plans with the public. A request was made to the PM USA Corporate Affairs Department, and strategic plans from five anti-smoking organizations were received. Two of these are state government agency reports - one from the 1989 Michigan Tobacco Reduction Task Force and one from the California Tobacco Education Oversight Committee. Two are from publicly supported anti-smoking groups - STAT (Stop Teenage Addiction to Tobacco) and the American Cancer Society. The last is from the Advocacy Institute, a non-profit center for the study, analysis, and teaching of advocacy strategies and skills for use by non-profit and citizens groups to effect public policy change. Each of these will be discussed below.

B. State Government Agency Reports

1. Michigan Tobacco Reduction Task Force

The Michigan Tobacco Reduction Task Force, Michigan Department of Public Health, issued a report in 1989 describing a six-part strategy to reduce the incidence of smoking in the state of Michigan by at least 50% in the year 2000. The first strategy is that, "Aggressive measures must be taken to prevent children and adolescents from gaining access to cigarettes, smokeless tobacco, and other tobacco products." Tactics to accomplish this objective include licensing of tobacco retailers, prohibiting sales through vending machines, significantly increasing excise taxes to discourage smoking, prohibiting distribution of free or discounted tobacco products, and prohibiting billboards and other signs advertising tobacco products.

The second strategy requires that, "Stronger efforts must be made to protect Michigan residents from the adverse health effects of environmental tobacco smoke and from fires caused by smoking materials." Tactics in support of this strategy include extending the Michigan Clean Indoor Air Act to the private sector, requiring that at least 50% of restaurant seats be designated as non-smoking, providing totally smoke-free

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travel on intrastate and local public conveyances, setting state-wide air quality standards for ETS, and setting fire safety standards.

"Tobacco users must be offered information, assistance, and continued support for quitting and remaining tobacco-free. Special attention must be given to minorities, persons with low income, and other groups with high levels of use," is the third strategy. It is interesting to note that a key aspect of all anti-smoking plans involves the targeting of certain groups who are deemed more likely to smoke. These groups include women, blacks, Hispanics, individuals with low incomes, and individuals with low educational levels. Tactics to accomplish this strategy include enlisting the assistance of the "health" community; making tobacco cessation services available; providing access to tobacco cessation services through insurance reimbursement; and requiring employers, unions, and insurers to work cooperatively to develop incentives for reducing tobacco use among workers.

The fourth strategy is, "More vigorous efforts must be made to instill a tobacco-free lifestyle in the Michigan population." Tactics include expanding the Michigan Department of Health's anti-tobacco media campaign; strengthening school-based anti-tobacco programs; ensuring that all school buildings and grounds are tobacco-free; prohibiting the use and sale of tobacco products in health care facilities; and, most importantly, enacting a law that prohibits Michigan from manufacturing, selling or promoting tobacco products, and from profiting from investments in firms that manufacture tobacco products.

The last major strategy is, "The Michigan Congressional Delegation should support strengthened federal anti-tobacco policies and programs. Michigan's US Senators and Representatives should be urged to introduce or support legislation consistent with the intent of this report..." Such legislation includes increasing federal tobacco excise taxes; making federal funding available for large, ongoing anti-tobacco media campaigns managed by the states; empowering the FCC to require the broadcast media to provide free air time for anti-tobacco public service messages as a condition of licensing; giving the FDA jurisdiction for the regulation of tobacco and other nicotine-bearing products; banning smoking on all interstate public conveyances; opposing the use of trade sanctions intended to encourage the export of US tobacco products to foreign markets; establishing fire safety standards; providing Medicare coverage for tobacco cessation services; prohibiting advertising; and eliminating federal income tax deductions for advertising of tobacco products.

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2. California Tobacco Eduction Oversight Committee

The California Tobacco Eduction Oversight Committee submitted a report, "Toward a Tobacco-Free California: A Master Plan to Reduce Californians' Use of Tobacco," to the state Legislature on January 1, 1991. The objective of this report is to determine a strategy to reduce the use of tobacco products within the state of California by 75% in the year 1999. The plan outlines three main strategies - media intervention, policy development, and program services.

The primary goals of the master plan's media intervention strategy in a comprehensive tobacco prevention and control effort are to support non-use of tobacco, increase motivation among users to quit using tobacco, and enhance public support for policy changes that support tobacco control. Tactics include continuing the current statewide media campaign; targeted media intervention, that is providing media coverage with cultural and language-appropriate messages to reach certain groups such as blacks and Hispanics; and the expansion of local media campaigns.

It is interesting to note that the state of California is claiming great success for the California anti-smoking media program. For instance, an October, 1990, press release claimed that "Research Data Shows Significant Drop in Tobacco Usage Since Enactment of California's Tobacco Education Campaign." Claims have been made that the media campaign is responsible for a 13% decline in smoking in the state. An article in the Wall Street Journal (August 5, 1991) points out, however, that this decline occurred before the media campaign started and can be attributed to the large excise tax increase. In actuality Californians bought 1% more packs of cigarettes in 1990 than in 1989 even though the media campaign was initiated in April, 1990. Nevertheless, California has been able to tout the program as a major success, and other states are thinking about similar endeavors.

Policy development goals include reducing access to tobacco and protection from second-hand smoke. Tactics to reduce access to tobacco include prohibiting the sale of tobacco through vending machines; prohibiting distribution of free or discounted tobacco products; requiring annual licensing fees from retailers; and prohibiting the sale of tobacco products in all state and local government owned, funded and leased buildings. Tactics with respect to protection from second-hand smoke are promoting tobacco-free workplaces and public places through general fiscal incentives to promote smoke-free commercial buildings, and extending the California Indoor Air Act to the private sector without preempting stronger local ordinances.

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Program services are those services which support individuals in making the behavioral changes necessary for them to quit smoking. The plan defines three main types of services in a comprehensive tobacco control effort; namely, prevention services, school and non-school based; cessation resources, such as self-help strategies; and tobacco information and education. School based prevention services include ensuring that all educational institutions, school campuses, and school-sponsored events are tobacco free; and providing County Offices of Education and local school districts with the necessary training in integrated tobacco curricula and model programs. Community based prevention services include providing tobacco prevention education to high-risk youth through a variety of settings; and creating or adapting tobacco use prevention materials, media, and programs that are sensitive to culture, ethnicity, language, and literacy mode.

Cessation resources include attempting to enlist as many channels as possible to reach populations with high tobacco usage such as trade and vocational schools and work sites, as well as physicians, dentists, pharmacists, and substance abuse counselors; and continuing to target women and their families as well as pregnant women in order to provide them multiple and varied educational opportunities where they meet, work, and live.

Tobacco Information and Education efforts include ensuring that the statewide media campaign provides information to the public regarding facts and issues related to tobacco in order to generate public support for tobacco reduction policies; providing educational programs at the state and local level that correctly portray tobacco use as a public health problem; and educating and training influential health care providers, school representatives, and business and community leaders to serve as local tobacco cessation advocates and community resources.

3. Similarities Between the Two Reports

The manifold similarities between these two plans - from two different states and written two years apart - are quite evident even from reading the brief write-up above. When reading the actual documents themselves, the similarities are even more striking. In many cases passages are actually verbatim. Two possible reasons can be advanced to explain this. The first is that the California committee utilized the Michigan report as its chief source document. The more likely explanation, however, is that there is an anti-smoking advocacy group which had already drawn up a general blueprint for a massive government intervention effort to eliminate smoking. Both states, in turn, drew generously from this document. This would suggest that most state and local governments will be presented with essentially identical programs which will advocate

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essentially the same actions. Consequently, PM USA should have an excellent idea of what to expect with regard to government anti-smoking programs.

C. Stop Teenage Addiction To Smoking (STAT)

STAT is a private, non-profit anti-smoking group located in Springfield, Massachusetts. It has an annual budget of about $125,000, and publishes a newsletter, The Tobacco and Youth Reporter, which has a circulation of about 100,000. The STAT six-year Progress Report (1985-1991) outlines its mission; namely, to "stop teenage addiction to tobacco by: 1) eliminating the sale of tobacco to young people; 2) preventing tobacco companies from promoting tobacco addiction among our youth; and 3) generating direct social and economic pressure on tobacco companies to force them to stop unethical campaigns to promote smoking.

STAT's agenda for the 1990's is to: 1) eliminate tobacco sales to minors through merchant licensure, elimination of sampling, elimination of vending machines, and establishing a minimum legal age of 21 for the purchase of cigarettes; 2) end tobacco advertising and promotion including the elimination of brand identities by the year 2000; protect children from ETS; exert social and economic pressure on the nicotine (**note the word nicotine**) industry including an already existing boycott of Nabisco and Kraft; 5) train and equip activists to be effective pro-health change agents; 6) participate in coalitions and network with other pro-health organizations; and 7) reach out to assist pro-health organizations fighting against tobacco addiction in other countries.

Although STAT professes to be concerned only with teenage smoking, its agenda clearly goes beyond this. As was noted above they deliver a strong message that smoking is addictive, and that the real evil is nicotine. Lastly, it should be noted that as a private organization, they can take at least one action that cannot be taken be a governmental organization; i.e. a boycott. STAT called for a boycott of both Nabisco and Kraft in 1990, and it intends to continue this boycott.

D. American Cancer Society

The American Cancer Society issued "A Global Plan to Resist Aggression by the Transnational Tobacco Companies," a report from the Trade for Life summit held in Washington, D.C., January 6-8, 1990. This document is extremely militant, and has as its central theme the prevention of tobacco and tobacco product exports. The plan outlines three major objectives: "To take action in exporting countries to reduce world trade in tobacco products and curb the marketing aggression of Transnational Tobacco Companies through a *Trade for Life* campaign; to place tobacco control at the top of the agenda of international governmental and non-governmental health and development organizations; [and] to bolster national resistance to

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the Transnational Tobacco Companies, particularly in newly targeted and potential target countries."

The Report specifies a number of priorities for each of these objectives and a number of tasks to accomplish each priority. For each task, a list of "principal actors" is given consisting of a variety of anti-smoking groups. The total number of anti-smoking groups in the Report is quite large. The first two priorities for objective number 1 are to secure the passage of legislation to end the US government's support for US cigarette exporters to gain access to overseas markets, and to persuade the US government to seek no further action against Thailand and to accept no future tobacco cases. Tasks in support of these priorities are to mobilize public support; broaden support beyond health groups to include consumers, women's groups, and churches; to gain Congressional support; and to directly lobby the Administration to drop the Thailand case and its support for tobacco exports. The third priority is to lobby the General Agreement on Tariffs and Trade (GATT) to recognize the unique unfitness of tobacco for normal trade considerations and to ensure that national governments retain the power to place restrictions on the import, distribution and marketing of tobacco products in their countries. Tasks in support of this priority include coordination of evidence to the GATT expert panel on the impact of tobacco companies in targeted markets; ensuring the passage of a resolution in support of Thailand at the 7th World Conference on Tobacco and Health in Perth, Australia; lobbying governments worldwide to support GATT recognition of tobacco trade restrictions as justifiable on health grounds; and lobbying the US Congress to express continued opposition to the US Government's efforts on behalf of tobacco companies. Priority four would require transnational tobacco exporters to adhere to labelling requirements and advertising restrictions at least as stringent as those in force in their home country. (This priority is particularly annoying since it would place the US at a considerable disadvantage versus Japan.) Priority five would place tobacco on the United Nations list of goods whose sale or distribution has been banned or severely restricted. Priority number six would be to persuade the UN to apply its consumer guidelines to tobacco and adopt a marketing code for tobacco companies. Priority seven is to remove all export assistance to tobacco manufacturers and producers. The tasks outlined for this priority are interesting in that they are to first identify all sources of support for tobacco exports in each exporting country and then lobby governments to remove all sources of government support for tobacco exports. The last priority is particularly important in that it is to undertake shareholder education campaigns and take measures to hold those with stakes in tobacco companies accountable for the activities of their companies. The two tasks outlined for this priority are to identify shareholders in tobacco companies and encourage them to dispose of their shareholdings in protest against tobacco company abuses, and take measures to hold tobacco company executives accountable for tobacco company marketing abuses.

The second objective which is to place tobacco control at the top of the agenda for international health and development organizations has six priorities. The first priority is to

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organize a UN resolution and mobilize support from member nations on the need for countries to recognize the public health threat posed by tobacco and to implement effective anti-tobacco measures. The second priority is to raise the priority given to tobacco control by the World Health Organization (WHO). It should be noted that "Tobacco or Health" became an official WHO program in January, 1990. This program outlined a seven-year plan of action covering the years 1988-1995 with three principal objectives: 1) the promotion of national tobacco control programs to prevent and reduce tobacco use; 2) the promotion of the concept of tobacco-free societies and the establishment of the non-use of tobacco as normal social behavior through advocacy and public information campaigns; and 3) the establishment of an information clearinghouse. This program has been funded, but the level of funding is only about 1% of WHO's total budget. The American Cancer Society Report recommends that this level of funding be significantly increased. The next three priorities involve the lobbying of three international organizations - the United Nations Development Program, the United Nations Environmental Program, and the Food and Agricultural Organization - to increase their involvement in the control of tobacco and tobacco products. The last priority is to seek greater funds from the World Bank, the Regional Development Banks, and from other donor agencies for tobacco control projects in developing countries.

The last objective, bolstering national resistance to the tobacco companies, has seven priorities. The first priority is interesting in that it is to secure the adoption of more stringent anti-tobacco measures by the industrialized economies. It is clear that there was some internal disagreement about this priority in that concern was expressed that if sales declined in the industrialized nations, more pressure would be placed on exporting tobacco products to the developing nations. However, the real issue with all US-based anti-smoking groups is to eliminate the tobacco industry, so this priority remained. The US was targeted as a particular "local point for action" since it has "limited anti-tobacco restrictions and low excise taxes at the federal level." Priority two is to secure more stringent tobacco control policies in target countries. Priority number three is to enhance information flow worldwide on successful tobacco control strategies and provide an early warning system for new tobacco company and government actions. The tasks in support of this priority are to develop an American Cancer Society GLOBALink database, regional networks and information and action alert systems, and to recruit members to GLOBALink. GLOBALink is a computer-based communications system. Priority four is to increase data available to tobacco control advocates in target countries. The American Cancer Society sponsors a Third World Atlas which provides a compilation of existing data on smoking prevalence, mortality and morbidity, tobacco agriculture, excise yields, and the structure of the tobacco industry in many developed countries. The goal is to improve both the quality and quantity of data included in this Atlas. Priority five is to develop new educational materials both in target and exporting countries. Priority six is to develop and broaden the tobacco control coalition in target countries. Interestingly, this priority actually is an attempt to involve more women in the tobacco control coalition as can be seen by the tasks in support of

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this priority: 1) identify women working in tobacco control and compile a directory of women activists; 2) create an international network of women working in the tobacco control area; 3) survey the priority given to women and smoking by the international health non-government organizations and international governmental agencies; and 4) persuade WHO to sponsor a "Women and Tobacco" conference. The last priority is to provide training for national control leaders in target countries.

Clearly, the major thrust of this plan is focused on eliminating US exports of tobacco products abroad. At this time, there seems to be little probability of the success of this plan. Nevertheless, should there be limitations on export of cigarettes from the US in the future, the impact on PM USA would be severe. We are projecting the export of 132 billion units by 1996. If cigarettes could not be exported from the US, they would have to be made elsewhere, most likely Europe. This would lead to a severe under-utilization problem within the US and a severe capacity problem in PM factories elsewhere.

E. The Advocacy Institute

A proposal to establish a Smoking Control Advocacy Resource Center (SCARC) was issued by the Advocacy Institute in July, 1987. The Advocacy Institute is a non-profit center for the study, analysis, and teaching of advocacy strategies and skills for use by non-profit and citizen groups to effect public policy change. It was founded in Washington, D.C., in 1984, and has been involved in a number of issues besides smoking control including nuclear arms limitation and assurance of citizen access to essential information. The proposed SCARC would have three goals: 1) strengthening the disparate forces engaged in smoking control advocacy by enhancing cooperation among them; 2) systematically tracking and dispassionately analyzing the tobacco industry's organized resistance to public education about the hazards of smoking; and 3) enabling smoking control advocates to optimize opportunities for advancing smoking control initiatives through effective use of the mass media. To accomplish these goals, SCARC would provide a number of resources outlined below.

The first of these, the intelligence gathering network, deserves some discussion. The purpose of this network is to "establish and maintain an interactive network of key intelligence gatherers and industry analysts. Through this network, individuals who have shown skill and persistence in tracking the activities of the tobacco industry can be provided modest support for such activities and, in turn, contribute to a central, shared intelligence pool. Each member of this Intelligence Gathering Network will take special responsibility for monitoring and mapping one or more discrete areas of tobacco industry behavior." The rationale for the creation of such a network is to be able to anticipate the tobacco industry's response to smoking control measures. To quote the prospectus once again, "At each stage of the development of smoking control methods throughout the world the industry has reacted dynamically, altering its strategies and

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redeploying its resources to anticipate and meet the challenge...While the smoking control forces have no ready response to these efforts, they will remain at a severe disadvantage." The threat of such a network should not be taken lightly, and every effort should be made to protect information generated by PM USA R&D from falling into such hands. Other information networks which are recommended are a spark plug network - 50 to 75 of the nation's most effective regional and local smoking control advocates, and a network of international smoking control experts.

Special population networks are proposed to target specific at-risk groups. The three networks proposed are a women's network, outreach to blacks, and outreach to youths and Hispanics. The description of the outreach to black network demonstrates the type of tactics that the Advocacy Institute is willing to sink to. "A first requirement in serving the Black community is the development of a symbolic framework for smoking control issues that resonates with the important values of Black leaders. For example, tobacco promotion to Blacks can be viewed as a form of exploitative colonialism (what cannot be sold to industrialized white communities is 'dumped' on Blacks). It might also be effective to emphasize the racial implications of tobacco marketing strategies..young Blacks are targeted for tobacco addiction."

The prospectus recommends the establishment of a SCARC Library and Information Clearinghouse, and a Media Resource Center. The media resource center would consist of: 1) media strategy development with the objective of establishing effective strategies for accessing and using the mass media for public education; 2) media materials development and dissemination with the objective of creating, adapting, reproducing, and distributing smoking control media and media training materials; and 3) media research, monitoring, and networking with the objective of increasing the responsiveness of tobacco control advocates to changes in media coverage of smoking related issues.

Strategic planners and consultants would be made available. An example of strategic planning is instructive. "Excessive zeal by anti-smoking advocates directed toward smokers rather than the tobacco industry could threaten the smoking control cause by polarizing and galvanizing smokers. The tobacco industry has already tried to capitalize on this possibility by organizing a smokers' backlash to the American Cancer Society's annual Great American Smoke-Out." Consultants would in general be tactical or media consultants. In addition advocacy and media training would be provided.

A number of special projects are proposed. These are 1) a special population demonstration project, specifically the women's network; 2) a volunteer project for a smoke-free indoors; 3) the Smoking Control Advocate's Media Handbook and the Coalition Building Guide which will serve the need for community organizing and mobilization insights and strategies.

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Lastly, information and resource dissemination will be formalized through the smoking control computer bulletin board, action alerts, and the SCARC Newsletter.

F. Conclusions

There are at least three key conclusions that can be drawn from this analysis relative to PM USA R&D. The first is that **PM USA must actively continue to grow the business.** As long as PM USA continues to provide a significant portion of PM Companies' profits and cash flow, attacks on shareholders and threats to boycott Kraft will have a minimal or zero effect. The second point is that **any products viewed by our consumers and our non-smoking supporters as a positive development should be pursued with considerable resources.** Such products would specifically provide a benefit to our consumers and would be more socially acceptable than our present product line. To successfully carry out such a strategy we must be sure that we know how our consumers view our products. Such products would considerably weaken the current arguments of the anti-smoking forces. The last point is that the US anti-smoking movement has absolutely no interest in having the industry provide an allegedly "safer cigarette." Their objective is to eliminate smoking. Consequently, **research conducted at PM USA R&D to provide benefits should be targeted by what our consumers want rather than attempting to placate anti-smoking forces.**

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APPENDIX H

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APPENDIX H

Environmental Regulations

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FEDERAL (34 Laws)

The National Environmental Policy Act
Comprehensive Environmental Response, Compensation and Liability Act
Emergency Planning and Community Right-to-Know Act
Clean Air Act
Energy Supply and Environmental Coordination Act
Radon Research and Indoor Air Research Act
Resource Conservation and Recovery Act
Federal Water Pollution Control Act
Water Resources Planning Act
Safe Drinking Water Act
Federal Environmental Pesticide Control Act
Soil and Water Resources Conservation Act
Water Resources Research Act
Toxic Substances Control Act
Oil Spill Prevention Act
Occupational Safety and Health Act
EPA's New Source Performance Standards
EPA's National Emission Standards for Hazardous Air Pollutants
EPA Stratospheric Ozone Protection Regulations
EPA Regulations for Assessment and Collection of Noncompliance Penalties
EPA National Pollutant Discharge Elimination System Permit Regulations
EPA Regulations on Designation of Hazardous Substances
EPA Regulations on Determination of Reportable Quantities for Hazardous Substances
EPA Regulations on Criteria and Standards for the National Pollutant Discharge Elimination System
EPA National Primary Drinking Water Regulations
EPA National Secondary Drinking Water Regulations
EPA Toxic Pollutant Effluent Standards
EPA General Provisions for Effluent Guidelines and Standards
EPA General Regulations for Hazardous Waste Management
EPA Regulations for Identifying Hazardous Waste
EPA Regulations for Hazardous Waste Generators
EPA Regulations for Hazardous Waste Transporters
EPA Regulations for Owners and Operators of Permitted Hazardous Waste Facilities
EPA Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks
EPA Regulations on Approval of State Underground Storage Tank Programs

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VIRGINIA (20 Laws)

Virginia Air Pollution Control Laws
Virginia Environmental Quality Act
Virginia Air Pollution Control Law
Virginia Air Pollution Control Regulations
Virginia Litter Control and Recycling Act
Virginia Waste Management Act
Virginia Underground Storage Tanks Act
Virginia Hazardous Materials Emergency Response Act
Virginia Solid Waste Regulations
Virginia Hazardous Waste Management Regulations
Virginia Fees for Hazardous Waste Facility Site Certification
Virginia Rules for Hazardous Waste Facility Site Certification
Virginia Financial Assurance Rules for Solid Waste Facilities
Virginia State Water Control Law
Virginia Environmental Impact Report Law
Virginia Water Pollution Control Regulations
Virginia Discharge Permit Regulations
Virginia Water Quality Standards
Virginia Chesapeake Bay Preservation Act
Virginia Department of Commerce Asbestos Removal Licensing Act

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NORTH CAROLINA (13 Laws)

North Carolina Water and Air Resources Acts
North Carolina Environmental Policy Act
North Carolina Air Pollution Control Laws
North Carolina Air Pollution Control Regulations
North Carolina Solid and Hazardous Waste Management Act
North Carolina Comprehensive Environmental Response Act
North Carolina Solid Waste Management Regulations
North Carolina Hazardous Waste Management Regulations
North Carolina Area Management Act
North Carolina Oil Pollution and Hazardous Substances Control Act
North Carolina Water Pollution Control Regulations
North Carolina Water Quality Standards
Rocky River Treatment Plant Discharge Regulations

KENTUCKY & JEFFERSON COUNTY (12 Laws)

Kentucky Environmental Protection Law
Kentucky Air Pollution Control Regulations
Kentucky Solid Waste Law
Kentucky Underground Storage Tanks Laws
Kentucky Waste Management Regulations
Kentucky Waste Discharge Regulations
Kentucky PDES Permitting Program Regulations
Kentucky Spills Regulations
Kentucky Biochemically Degradable Wastes Regulation
Kentucky Water Quality Standards
Jefferson County Air Pollution Control Regulations
Jefferson County Metropolitan Sewer Discharge Regulation

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APPENDIX I

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APPENDIX I

Cigarette Category Performance and Projections

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	ANNUAL VOLUME (000)			ANNUAL SHARE		
	DEC 1988	DEC 1989	DEC 1990	DEC 1988	DEC 1989	DEC 1990
PHILIP MORRIS	219,298,440	219,544,736	220,519,559	39.31	41.93	42.26
R.J. REYNOLDS	177,210,359	149,425,150	154,490,180	31.77	28.54	29.61
BROWN & WILLIAMSON	61,083,429	59,464,375	53,723,701	10.95	11.36	10.30
LORILLARD	45,638,137	41,394,628	39,754,880	8.18	7.91	7.62
AMERICAN	38,804,072	36,614,000	35,535,764	6.96	6.99	6.81
LIGGETT	15,658,375	17,040,280	17,682,566	2.81	3.25	3.39
TOT INDUSTRY	557,804,345	523,587,875	521,810,989			
FULL MARGIN						
1) TOTAL DOMESTIC	495,785,741	445,592,164	421,436,365	88.88	85.10	80.76
2) TOTAL NON-FILTER	25,379,742	21,372,314	19,213,779	4.55	4.08	3.68
3) FF/MEN/KING/SP	38,093,064	33,152,236	30,021,109	6.83	6.33	5.75
4) FF/MEN/KING/BOX	8,135,239	8,503,932	8,368,069	1.46	1.62	1.60
5) FF/MEN/100'S/SP	22,820,934	20,454,029	18,999,256	4.09	3.91	3.64
6) FF/MEN/100'S/BOX	1,599,184	1,699,965	1,809,675	0.29	0.32	0.35
7) FF/REG/KING/SP	71,560,329	60,120,964	56,736,778	12.83	11.48	10.87
8) FF/REG/KING/BOX	39,757,807	38,866,298	38,851,817	7.13	7.42	7.45
9) FF/REG/100'S/SP	33,646,898	28,476,979	25,270,056	6.03	5.44	4.84
10) FF/REG/100'S/BOX	6,672,202	6,641,401	6,683,020	1.20	1.27	1.28
11) LIGHTS/MEN/KING/SOFT	19,793,036	16,706,302	14,908,989	3.55	3.19	2.86
12) LIGHTS/MEN/KING/BOX	2,573,439	2,427,983	2,286,900	0.46	0.46	0.44
13) LIGHTS/MEN/100'S/SOFT	15,753,450	13,242,040	11,699,636	2.82	2.53	2.24
14) LIGHTS/MEN/100'S/BOX	10,052,093	9,073,502	8,264,406	1.80	1.73	1.58
15) LIGHTS/REGULAR/KING/SOFT	59,535,807	52,733,624	49,932,456	10.67	10.07	9.57
*16) LIGHTS/REGULAR/KING/BOX	20,700,638	22,566,903	24,730,237	3.71	4.31	4.74
17) LIGHTS/REGULAR/100'S/SOFT	40,457,584	34,816,210	31,203,671	7.25	6.65	5.98
18) LIGHTS/REGULAR/100'S/BOX	11,389,889	11,465,718	10,839,967	2.04	2.19	2.08
19) ULTRA LTS/MEN/KING/BX&SP	4,826,354	4,511,805	4,246,560	0.87	0.86	0.81
20) ULTRA LTS/MEN/100'S/120'S/BX&SP	10,808,115	10,513,781	10,443,447	1.94	2.01	2.00
21) ULTRA LTS/REGULAR/KING/BX&SP	15,844,113	14,600,919	14,377,774	2.84	2.79	2.76
22) ULTRA LTS/REG/100'S/120'S/BX&SP	23,887,559	22,225,786	21,818,917	4.28	4.24	4.18
23) ULTRA LOW TAR/KING/REG/MEN/BX&S	5,000,527	4,571,732	4,128,820	0.9	0.87	0.79
24) ULTRA LOW TAR/100'S/REG/MEN/BX&S	9,849,049	9,032,376	8,786,095	1.77	1.72	1.69
25) SLIMS/100'S/120'S/MENTHOL/BX&SP	16,235,179	14,882,178	14,345,414	2.91	2.84	2.75
26) SLIMS/100'S/120'S/REGULAR/BX&SP	16,592,612	15,324,802	14,320,854	2.97	2.92	2.74

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

	DEC 1988	DEC 1989	DEC 1990	DEC 1988	DEC 1989	DEC 1990
PRICE VALUE						
1) TOT PRICE VALUE	62,018,609	77,995,707	100,374,627	11.12	14.90	19.24
2) FF/BRD GNR/MEN/KING/BX&SP	499,091	1,731,137	1,859,302	0.09	0.33	0.36
3) FF/BRD GNR/MEN/100/BX&SP	474,135	1,881,685	2,195,356	0.09	0.36	0.42
4) FF/BRD GNR/REG/KING/BX&SP	3,887,109	9,487,977	9,906,820	0.70	1.81	1.90
5) FF/BRD GNR/REG/100/BX&SP	4,493,769	7,705,164	7,998,108	0.81	1.47	1.53
6) LIGHTS/BRD GNR/MEN/KING/BX&SP	2,514,209	2,804,004	3,088,992	0.45	0.54	0.59
7) LIGHTS/BRD GNR/MEN/100/BX&SP	4,617,332	5,161,764	5,937,016	0.83	0.99	1.14
8) LIGHTS/BRD GNR/REG/KING/BX&SP	5,721,646	7,596,536	8,318,773	1.03	1.45	1.59
9) LIGHTS/BRD GNR/REG/100/BX&SP	7,911,738	9,061,764	9,502,632	1.42	1.73	1.82
10) ULTRA LTS/BRD GNR/REG/KING/100	3,578,977	4,609,749	5,602,518	0.64	0.88	1.07
11) TOT BLACK + WHITE GNR/PL	18,241,895	14,461,192	18,811,194	3.27	2.76	3.60
12) PRICE VALUE 25'S	6,672,828	4,642,788	3,641,211	1.20	0.89	0.70
13) TOT PRICE-OFF BRANDS	3,302,395	3,817,650	5,160,700	0.59	0.73	0.99
14) TOT SUB GENERICS	2,604	4,910,528	18,212,297	0.00	0.94	3.49

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

INDUSTRY VOLUME ESTIMATES
PRICE VALUE VS. FULL MARGIN

30-Apr-91
:.E.T. - $2/1000 IN JAN.91,JAN.93
'RICE VALUE SHARE @ 25.64 IN 1991,36 IN 1995
NDUSTRY DECLINE -2.5%/YEAR (TAKEAWAY)
OWER MARLBORO PRICING

		INDUSTRY PRICE VALUE					INDUSTRY FULL MARGIN			
YEAR		INDUSTRY VOLUME++	VOLUME+	% CHANGE VS. YAG	SHARE	DIFF VS. YAG	VOLUME++	% CHANGE VS. YAG	SHARE	DIFF VS. YAG
1980		616.71					616.65			
1981		622.45					625.61			
982		622.31	5,932	100.0%	0.95	0.50	616.37		99.05	
983		595.97	19,846	100.0%	3.33	2.38	576.12	-6.5%	96.67	-2.38
984		599.70	33,103	66.8%	5.52	2.19	566.60	-1.7%	94.48	-2.19
985		594.69	43,412	31.1%	7.30	1.78	551.28	-2.7%	92.70	-1.78
986		581.93	51,792	19.3%	8.90	1.60	530.14	-3.8%	91.10	-1.60
987		570.03	58,314	12.6%	10.23	1.33	511.72	-3.5%	89.77	-1.33
988		557.80	62,025	6.4%	11.12	0.89	495.78	-3.1%	88.88	-0.89
989		523.59	77,996	25.7%	14.90	3.78	445.59	-10.1%	85.10	-3.78
990	-0.34%	521.81	100,375	28.7%	19.24	4.34	421.44	-5.4%	80.76	-4.34
991*	-2.67%	507.90	130,226	29.7%	25.64	6.40	377.67	-10.4%	74.36	-6.40
992*	-2.48%	495.30	146,807	12.7%	29.64	4.00	348.49	-7.7%	70.36	-4.00
993*	-3.15%	479.68	156,568	6.6%	32.64	3.00	323.11	-7.3%	67.36	-3.00
994*	-2.48%	467.80	161,578	3.2%	34.54	1.90	306.22	-5.2%	65.46	-1.90
995*	-2.50%	456.10	164,196	1.6%	36.00	1.46	291.90	-4.7%	64.00	-1.46

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

30-Apr-91

TOTAL PRICE VALUE GROUP MARKET SHARE

:.E.T. - $2/1000 IN JAN.91,JAN.93
'RICE VALUE SHARE @ 25.64 IN 1991,36 IN 1995
NDUSTRY DECLINE -2.5%/YEAR (TAKEAWAY)

	TOTAL	DIFF VS. YAG	BLACK & WHITE	DIFF VS. YAG	BRANDED	DIFF VS. YAG	PV 25'S	DIFF VS. YAG	PRICE-OFF	DIFF VS. YAG	SUB-GENERICS	DIFF VS. YAG	PV 30'S
1980	0.04		0.04										
1981	0.45	0.41	0.45	0.41									
1982	0.95	0.50	0.95	0.50	0.00	0.00	0.00	0.00					
1983	3.33	2.38	2.92	1.97	0.36	0.36	0.05	0.05					
1984	5.52	2.19	4.35	1.43	0.38	0.02	0.78	0.73					
1985	7.30	1.78	4.62	0.27	1.38	1.00	1.30	0.52					
1986	8.90	1.60	4.30	-0.32	2.69	1.31	1.90	0.60	0.01	0.01			
1987	10.23	1.33	3.95	-0.35	4.34	1.65	1.70	-0.20	0.24	0.23			
1988	11.12	0.89	3.27	-0.68	6.05	1.71	1.20	-0.50	0.60	0.36			
1989	14.90	3.78	2.76	-0.51	9.55	3.50	0.89	-0.31	0.74	0.14	0.94	0.94	0.02
1990	19.24	4.34	3.61	0.85	10.42	0.87	0.69	-0.20	0.99	0.25	3.50	2.56	0.03
1991*	25.64	6.40	5.66	2.05	11.46	1.04	0.60	-0.09	1.11	0.12	6.79	3.29	0.02
1992*	29.64	4.00	6.94	1.28	12.11	0.65	0.52	-0.08	1.17	0.06	8.87	2.08	0.03
1993*	32.64	3.00	7.94	1.00	12.61	0.50	0.46	-0.06	1.12	-0.05	10.48	1.61	0.03
1994*	34.54	1.90	8.58	0.64	12.93	0.32	0.41	-0.05	1.08	-0.04	11.51	1.03	0.03
1995*	36.00	1.46	9.07	0.49	13.18	0.25	0.37	-0.04	1.05	-0.03	12.30	0.79	0.03

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ANNUAL CATEGORY SHARES

Total Filter

AR	NON-MENTHOL 85's	NON-MENTHOL 100's	NON-MENTHOL 120's	NON-MENTHOL Tot.	MENTHOL 85's	MENTHOL 100's	MENTHOL 120's	MENTHOL Tot.	TOTAL FILTER 85's	TOTAL FILTER 100's	TOTAL FILTER 120's	TOTAL FILTER Tot.	Non-Filter
DUSTRY VOLUME													
N 000,000)													
1970	226,369	64,884		291,253	90,174	31,561		121,735	316,543	96,445		412,988	105,255
1971	235,552	72,811		308,362	91,107	36,486		127,593	326,659	109,296		435,955	99,025
1972	244,518	79,013		323,532	95,069	39,534		134,603	339,587	118,548		458,135	91,715
1973	251,749	85,076		336,825	101,567	44,678		146,245	353,316	129,754		483,070	87,530
1974	254,356	91,153		345,509	106,122	49,916		156,038	360,478	141,069		501,548	80,902
1975	254,882	93,098	4,551	352,531	107,935	51,898	3,192	163,025	362,817	144,997	7,743	515,557	75,542
1976	262,083	92,777	5,974	360,834	111,536	51,616	3,943	167,095	373,619	144,394	9,917	527,929	69,479
1977	258,894	101,442	6,130	366,465	110,577	56,490	3,966	171,033	369,470	157,932	10,096	537,499	63,461
1978	253,418	111,994	6,152	371,563	108,677	60,007	4,041	172,725	362,095	172,001	10,192	544,288	58,801
1979	254,509	119,600	6,343	380,452	107,280	63,246	4,208	174,735	361,789	182,846	10,551	555,187	54,707
1980	254,208	129,571	6,660	390,439	104,101	66,913	4,440	175,454	358,309	196,484	11,101	565,893	50,817
1981	254,788	136,948	7,392	399,128	102,429	71,293	5,074	178,796	357,217	208,241	12,467	577,924	48,552
1982	250,354	140,703	7,779	398,836	98,760	74,490	5,352	178,602	349,114	215,193	13,131	577,438	44,868
1983	239,340	141,423	7,748	388,510	89,335	72,469	5,245	167,049	328,675	213,892	12,992	555,560	40,406
1984	239,100	147,406	7,676	394,181	88,395	74,303	5,217	167,915	327,495	221,708	12,894	562,097	37,601
1985	238,651	147,128	7,969	393,748	87,063	73,623	5,650	166,336	325,714	220,751	13,619	560,084	34,611
1986	232,831	146,705	8,554	388,091	84,264	71,520	6,110	161,894	317,095	218,225	14,665	549,985	31,948
1987	228,071	146,727	8,379	383,177	81,116	70,570	5,985	157,671	309,186	217,297	14,365	540,848	29,186
1988	225,241	144,694	8,032	377,967	78,706	69,335	5,578	153,619	303,947	214,029	13,610	531,586	26,217
1989	214,252	137,023	7,592	358,867	71,627	65,344	5,236	142,207	285,879	202,367	12,828	501,074	22,514
1990	217,021	139,428	7,149	363,598	67,522	64,809	4,957	137,288	284,544	204,237	12,106	500,886	20,925
1991	213,013	137,285	6,857	357,155	65,113	62,319	4,774	132,206	278,126	199,605	11,631	489,362	18,538
1992	209,760	134,870	6,587	351,217	62,606	60,526	4,557	127,688	272,365	195,396	11,144	478,906	16,394
1993	204,437	131,869	6,275	342,581	59,683	58,055	4,311	122,049	264,121	189,924	10,586	464,630	14,370
1994	200,619	130,368	6,026	337,013	57,453	55,912	4,110	117,476	258,073	186,279	10,136	454,488	12,612
1995	196,730	128,633	5,785	331,149	55,298	54,068	3,917	113,283	252,028	182,701	9,702	444,431	11,069

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ANNUAL CATEGORY SHARES

"Marketed" Total Low Tar (For Analysis Purposes)

\R	LOW TAR NON-MENTHOL				LOW TAR MENTHOL				TOTAL LOW TAR			
	85's	100's	120's	Tot.	85's	100's	120's	Tot.	85's	100's	120's	Tot.
)USTRY VOLUME												
/ 000,000)												
1970	13,682			13,682								
1971	17,440			17,440	6,420			6,420	23,860			23,860
1972	21,334			21,334	7,918			7,918	29,252			29,252
1973	26,076			26,076	7,817	114		7,931	33,894	114		34,008
1974	29,239	524		29,763	9,610	349		9,960	38,849	874		39,723
1975	35,761	1,478		37,239	12,590	1,182		13,773	48,352	2,660		51,012
1976	61,712	4,122		65,834	22,940	2,151		25,091	84,653	6,273		90,925
1977	79,807	20,733		100,541	28,906	10,397		39,303	108,714	31,130		139,843
1978	92,092	42,880		134,971	37,572	21,289		58,861	129,664	64,169		193,833
1979	103,194	56,354	854	160,402	41,229	27,445	427	69,101	144,423	83,799	1,281	229,503
1980	107,863	69,750	1,665	179,278	41,690	34,042	802	76,534	149,552	103,792	2,467	255,811
1981	111,262	77,934	2,193	191,388	41,661	38,403	1,316	81,379	152,923	116,337	3,508	272,768
1982	111,891	83,265	2,738	197,893	40,077	42,628	1,556	84,260	151,967	125,893	4,294	282,154
1983	112,101	89,216	3,039	204,357	36,831	43,446	1,669	81,945	148,932	132,662	4,708	286,302
1984	109,925	94,273	3,118	207,316	35,682	45,277	1,799	82,758	145,607	139,550	4,918	290,074
1985	111,327	94,973	3,747	210,046	33,600	45,197	2,319	81,116	144,927	140,170	6,066	291,163
1986	109,927	97,008	4,481	211,416	33,694	44,518	2,968	81,180	143,621	141,526	7,449	292,596
1987	107,736	96,564	4,731	209,031	32,321	44,691	3,078	80,090	140,057	141,254	7,809	289,121
1988	107,042	95,607	4,797	207,447	31,181	44,290	3,068	78,539	138,224	139,897	7,865	285,986
1989	103,042	90,424	5,184	198,649	27,645	41,049	3,351	72,046	130,688	131,473	8,534	270,695
1990	105,771	92,308	4,801	202,880	26,665	41,223	3,079	70,966	132,436	133,531	7,879	273,846
1991	105,288	91,473	4,876	201,636	25,801	40,023	3,098	68,922	131,089	131,495	7,974	270,558
1992	105,152	90,541	4,804	200,497	25,062	38,931	3,071	67,064	130,214	129,471	7,875	267,561
1993	103,416	88,663	4,694	196,773	24,190	37,554	3,018	64,761	127,606	126,217	7,712	261,534
1994	101,875	87,581	4,624	194,080	23,542	36,527	2,989	63,059	125,416	124,108	7,614	257,139
1995	100,256	86,636	4,555	191,447	22,866	35,529	2,961	61,356	123,122	122,165	7,516	252,803

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

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ANNUAL CATEGORY SHARES

Ultra Low Tar

AR	NON-MENTHOL				MENTHOL				TOTAL ULTRA LOW TAR			
	85's	100's	120's	Tot.	85's	100's	120's	Tot.	85's	100's	120's	Tot.
DUSTRY VOLUME												
N 000,000)												
1970												
1971												
1972												
1973												
1974												
1975	3,901	355		4,256	1,419	296		1,714	5,320	650		5,970
1976	9,499	358		9,857	3,584	299		3,883	13,083	657		13,740
1977	12,800	1,082		13,882	4,988	300		5,288	17,788	1,382		19,171
1978	13,087	3,015		16,102	5,247	844		6,091	18,334	3,860		22,194
1979	20,919	6,221		27,140	6,831	1,952		8,782	27,750	8,173		35,923
1980	23,558	13,876		37,434	7,339	4,317		11,656	30,897	18,193		49,090
1981	26,124	19,108	251	45,482	8,645	7,017	188	15,850	34,769	26,124	439	61,332
1982	23,399	21,470	622	45,491	8,526	9,397	373	18,296	31,924	30,866	996	63,786
1983	21,753	23,839	715	46,307	7,152	9,774	477	17,402	28,904	33,612	1,192	63,709
1984	19,310	24,288	780	44,378	6,357	10,855	480	17,691	25,667	35,142	1,259	62,069
1985	18,079	24,680	833	43,591	5,769	10,586	476	16,830	23,847	35,265	1,308	60,421
1986	17,342	25,314	873	43,529	5,296	10,067	466	15,829	22,637	35,382	1,338	59,357
1987	16,702	27,248	855	44,805	4,845	10,147	399	15,391	21,547	37,394	1,254	60,196
1988	16,790	28,894	892	46,577	4,853	10,319	502	15,674	21,643	39,214	1,395	62,251
1989	15,917	28,117	1,100	45,133	4,555	10,053	524	15,132	20,472	38,170	1,623	60,265
1990	16,228	30,422	1,044	47,694	4,227	9,967	574	14,767	20,455	40,388	1,618	62,461
1991	16,608	30,677	1,067	48,352	4,165	9,904	559	14,628	20,773	40,581	1,625	62,980
1992	16,989	31,055	1,040	49,084	4,012	9,757	545	14,314	21,001	40,813	1,585	63,398
1993	16,957	30,896	1,006	48,858	3,832	9,532	527	13,891	20,789	40,428	1,533	62,749
1994	17,002	30,969	981	48,952	3,737	9,389	514	13,639	20,739	40,357	1,495	62,591
1995	17,081	31,065	957	49,103	3,735	9,292	501	13,528	20,816	40,357	1,458	62,631

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

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ANNUAL CATEGORY SHARES

Flavor Low 7-15mg.

AR	LOW TAR NON-MENTHOL 85's	100's	120's	Tot.	LOW TAR MENTHOL 85's	100's	120's	Tot.	TOTAL LOW TAR 85's	100's	120's	Tot.
DUSTRY VOLUME N 000,000)												
1970												
1971												
1972												
1973												
1974												
1975	31,860	1,123		32,983	11,172	887		12,058	43,032	2,010		45,042
1976	52,213	3,764		55,977	19,356	1,852		21,208	71,569	5,616		77,185
1977	67,007	19,651		86,658	23,918	10,096		34,014	90,925	29,748		120,673
1978	79,005	39,864		118,869	32,326	20,445		52,770	111,330	60,309		171,639
1979	82,275	50,133	854	133,262	34,398	25,494	427	60,319	116,673	75,627	1,281	193,580
1980	84,304	55,874	1,665	141,843	34,351	29,725	802	64,878	118,655	85,599	2,467	206,721
1981	85,138	58,826	1,942	145,906	33,015	31,386	1,128	65,529	118,153	90,213	3,070	211,436
1982	88,492	61,795	2,116	152,403	31,551	33,231	1,182	65,964	120,043	95,026	3,298	218,367
1983	90,348	65,377	2,324	158,050	29,679	33,672	1,192	64,543	120,028	99,050	3,516	222,593
1984	90,614	69,985	2,339	162,938	29,325	34,423	1,319	65,067	119,940	104,407	3,658	228,005
1985	93,248	70,293	2,914	166,455	27,832	34,611	1,844	64,287	121,080	104,904	4,758	230,742
1986	92,586	71,694	3,608	167,888	28,398	34,450	2,502	65,351	120,984	106,145	6,110	233,239
1987	91,034	69,316	3,876	164,227	27,476	34,544	2,679	64,699	118,510	103,860	6,555	228,926
1988	90,253	66,713	3,905	160,870	26,328	33,970	2,566	62,864	116,581	100,683	6,471	223,735
1989	87,125	62,307	4,084	153,516	23,090	30,996	2,827	56,914	110,215	93,303	6,911	210,430
1990	89,543	61,887	3,757	155,187	22,438	31,256	2,505	56,199	111,981	93,143	6,262	211,386
1991	88,679	60,796	3,809	153,284	21,637	30,118	2,540	54,295	110,316	90,914	6,349	207,579
1992	88,163	59,486	3,764	151,413	21,050	29,173	2,526	52,749	109,214	88,659	6,290	204,163
1993	86,459	57,767	3,688	147,915	20,358	28,022	2,491	50,870	106,817	85,789	6,179	198,785
1994	84,872	56,613	3,643	145,128	19,805	27,139	2,476	49,419	104,677	83,751	6,119	194,547
1995	83,174	55,571	3,598	142,344	19,131	26,237	2,460	47,828	102,305	81,808	6,058	190,171

2021529874

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

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ANNUAL CATEGORY SHARES

"Marketed" Total Full Flavor

AR	FULL FLAVOR NON-MENTHOL				FULL FLAVOR MENTHOL				TOTAL FULL FLAVOR			
	85's	100's	120's	Tot.	85's	100's	120's	Tot.	85's	100's	120's	Tot.
OUSTRY VOLUME												
N 000,000)												
1970												
1971	218,111	72,811		290,922	84,687	36,486		121,173	302,799	109,296		412,095
1972	223,184	79,013		302,198	87,151	39,534		126,685	310,335	118,548		428,883
1973	225,672	85,076		310,749	93,750	44,564		138,313	319,422	129,640		449,062
1974	225,117	90,629		315,746	96,512	49,566		146,078	321,629	140,196		461,825
1975	219,120	91,620	4,551	315,292	95,344	50,716	3,192	149,252	314,465	142,337	7,743	464,545
1976	200,371	88,655	5,974	295,000	88,596	49,465	3,943	142,004	288,966	138,121	9,917	437,004
1977	179,086	80,709	6,130	265,925	81,670	46,094	3,966	131,730	260,757	126,803	10,096	397,655
1978	161,326	69,114	6,152	236,592	71,104	38,718	4,041	113,863	232,431	107,832	10,192	350,455
1979	151,315	63,246	5,489	220,050	66,052	35,801	3,781	105,634	217,366	99,047	9,270	325,683
1980	146,345	59,821	4,995	211,162	62,411	32,871	3,639	98,920	208,756	92,692	8,634	310,082
1981	143,526	59,014	5,200	207,739	60,768	32,890	3,759	97,417	204,294	91,904	8,959	305,156
1982	138,463	57,439	5,041	200,943	58,683	31,862	3,796	94,342	197,147	89,301	8,837	295,284
1983	127,239	52,207	4,708	184,153	52,505	29,024	3,576	85,104	179,743	81,230	8,284	269,257
1984	129,175	53,133	4,558	186,866	52,713	29,025	3,418	85,157	181,888	82,159	7,976	272,023
1985	127,324	52,155	4,222	183,701	53,463	28,426	3,330	85,220	180,787	80,581	7,553	268,921
1986	122,904	49,697	4,074	176,675	50,570	27,002	3,142	80,714	173,474	76,699	7,216	257,389
1987	120,334	50,163	3,648	174,145	48,795	25,880	2,907	77,582	169,129	76,043	6,555	251,727
1988	118,198	49,087	3,235	170,520	47,525	25,045	2,510	75,080	165,723	74,132	5,745	245,601
1989	111,210	46,599	2,409	160,218	43,981	24,294	1,885	70,161	155,191	70,894	4,293	230,379
1990	111,250	47,120	2,348	160,718	40,858	23,586	1,879	66,322	152,108	70,705	4,227	227,040
1991	107,726	45,813	1,981	155,519	39,311	22,297	1,676	63,284	147,037	68,109	3,657	218,803
1992	104,607	44,329	1,783	150,720	37,544	21,595	1,486	60,625	142,151	65,924	3,269	211,345
1993	101,021	43,206	1,581	145,808	35,494	20,501	1,293	57,288	136,515	63,707	2,874	203,096
1994	98,745	42,786	1,401	142,933	33,911	19,385	1,121	54,417	132,656	62,171	2,522	197,350
1995	96,475	41,997	1,230	139,702	32,432	18,539	957	51,927	128,907	60,536	2,186	191,629

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DUSTRY VOLUME
N 000,000)

1970								
1971								
1972								
1973								
1974								
1975	51,189	3,724	1,832	56,746	311,627	141,273	5,911	458,811
1976	53,886	5,735	2,210	61,832	319,733	138,658	7,707	466,098
1977	51,622	6,250	2,284	60,156	317,848	151,682	7,812	477,343
1978	51,142	5,910	2,292	59,344	310,953	166,091	7,900	484,944
1979	50,255	6,953	2,257	59,465	311,534	175,893	8,295	495,722
1980	49,028	12,458	2,467	63,953	309,280	184,026	8,634	501,940
1981	52,812	16,414	3,070	72,295	304,405	191,827	9,397	505,629
1982	54,514	22,590	3,298	80,402	294,600	192,604	9,832	497,036
1983	58,226	27,593	3,516	89,335	270,449	186,299	9,476	466,224
1984	60,929	33,943	3,658	98,530	266,566	187,765	9,235	463,567
1985	63,870	35,444	4,758	104,072	261,844	185,307	8,861	456,012
1986	67,039	35,672	6,110	108,821	250,057	182,552	8,554	441,163
1987	68,518	37,109	6,270	111,898	240,668	180,188	8,094	428,951
1988	72,738	40,775	6,080	119,593	231,209	173,254	7,530	411,993
1989	75,187	40,212	6,074	121,472	210,692	162,155	6,754	379,601
1990	77,489	39,971	5,896	123,356	207,055	164,266	6,210	377,530
1991	79,639	39,819	5,993	125,451	198,487	159,785	5,638	363,910
1992	81,427	39,723	5,894	127,044	190,938	155,673	5,250	351,861
1993	82,196	39,230	5,748	127,175	181,924	150,693	4,838	337,456
1994	83,471	39,003	5,652	128,126	174,602	147,277	4,484	326,363
1995	84,586	38,718	5,557	128,861	167,442	143,984	4,145	315,570

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

... for reference only:

Prorate 1991 estimate of 115.8 billion up to 130.2 billion (see page 3)

02-Oct-91

ANNUAL CATEGORY SHARES

Price Value

EAR	NON-MENTHOL 85's	NON-MENTHOL 100's	NON-MENTHOL Tot.	MENTHOL 85's	MENTHOL 100's	MENTHOL Tot.	TOTAL PRICE VALUE 85's	TOTAL PRICE VALUE 100's	TOTAL PRICE VALUE NF	TOTAL PRICE VALUE Tot.	Generic	Branded	25's/30's	Price Off	Sub Generic
NDUSTRY VOLUME IN 000,000)															
1970	0	0	0	0	0	0	0	0	0	0	0	0	0		
1971	0	0	0	0	0	0	0	0	0	0	0	0	0		
1972	0	0	0	0	0	0	0	0	0	0	0	0	0		
1973	0	0	0	0	0	0	0	0	0	0	0	0	0		
1974	0	0	0	0	0	0	0	0	0	0	0	0	0		
1975	0	0	0	0	0	0	0	0	0	0	0	0	0		
1976	0	0	0	0	0	0	0	0	0	0	0	0	0		
1977	0	0	0	0	0	0	0	0	0	0	0	0	0		
1978	0	0	0	0	0	0	0	0	0	0	0	0	0		
1979	0	0	0	0	0	0	0	0	0	0	0	0	0		
1980	185	62	247	0	0	0	185	62	0	247	247	0	0		
1981	2,130	376	2,506	251	63	313	2,381	439	0	2,819	2,819	0	0		
1982	2,925	1,805	4,730	747	436	1,182	3,672	2,240	0	5,912	5,912	0	0		
1983	9,237	6,556	15,793	2,205	1,788	3,993	11,443	8,344	60	19,846	17,402	2,145	298		
1984	12,654	13,253	25,907	3,478	3,658	7,136	16,132	16,911	60	33,103	26,087	2,339	4,678		
1985	15,759	17,068	32,827	4,698	5,650	10,348	20,458	22,717	238	43,413	27,475	8,207	7,731		
1986	16,643	22,521	39,164	5,179	6,867	12,046	21,822	29,388	582	51,792	25,023	15,654	11,057	58	
1987	17,101	27,134	44,235	5,130	8,094	13,225	22,231	35,228	855	58,314	22,516	24,739	9,691	1,368	
1988	17,571	29,508	47,079	5,129	8,869	13,998	22,700	38,377	948	62,025	18,240	33,744	6,694	3,347	
1989	25,028	34,452	59,480	6,317	10,943	17,260	31,344	45,395	1,257	77,996	14,451	49,984	4,765	3,875	4,922
1990	32,039	44,667	76,706	7,671	14,141	21,812	39,762	58,808	1,826	100,375	18,837	54,373	3,757	5,166	18,263
1991	34,385	49,368	83,753	10,692	19,579	30,271	45,077	68,946	1,778	115,801	20,824	57,342	2,793	7,771	27,071
1992	36,850	52,353	89,204	12,001	22,274	34,275	48,851	74,627	1,833	125,311	19,812	61,368	2,377	7,875	33,879
1993	39,565	55,804	95,369	13,408	24,481	37,889	52,974	80,284	1,820	135,078	19,208	66,198	2,060	7,329	40,284
1994	40,684	57,313	97,998	15,752	27,828	43,580	56,436	85,142	1,822	143,400	18,824	69,738	1,868	6,866	46,103
1995	41,769	58,623	100,392	17,920	31,092	49,012	59,689	89,715	1,822	151,226	18,448	73,062	1,731	6,423	51,563

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Use for reference only:

Prorate 1991 estimate of 392.0 billion down to 377.67 billion

01-Oct-91

ANNUAL CATEGORY SHARES

Total Standard Price

	NON-MENTHOL				MENTHOL				TOTAL FILTER				
\R	85's	100's	120's	Tot.	85's	100's	120's	Tot.	85's	100's	120's	NF	Tot.
)USTRY VOLUME													
(000,000)													
1970	226,369	64,884	0	291,253	90,174	31,561	0	121,735	316,543	96,445	0	105,255	518,243
1971	235,552	72,811	0	308,362	91,107	36,486	0	127,593	326,659	109,296	0	99,025	534,980
1972	244,518	79,013	0	323,532	95,069	39,534	0	134,603	339,587	118,548	0	91,715	549,850
1973	251,749	85,076	0	336,825	101,567	44,678	0	146,245	353,316	129,754	0	87,530	570,600
1974	254,356	91,153	0	345,509	106,122	49,916	0	156,038	360,478	141,069	0	80,902	582,450
1975	254,882	93,098	4,551	352,531	107,935	51,898	3,192	163,025	362,817	144,997	7,743	75,542	591,099
1976	262,083	92,777	5,974	360,834	111,536	51,616	3,943	167,095	373,619	144,394	9,917	69,479	597,408
1977	258,894	101,442	6,130	366,465	110,577	56,490	3,966	171,033	369,470	157,932	10,096	63,461	600,960
1978	253,418	111,994	6,152	371,563	108,677	60,007	4,041	172,725	362,095	172,001	10,192	58,801	603,089
1979	254,509	119,600	6,343	380,452	107,280	63,246	4,208	174,735	361,789	182,846	10,551	54,707	609,894
1980	254,023	129,509	6,660	390,192	104,101	66,913	4,440	175,454	358,123	196,422	11,101	50,817	616,463
1981	252,658	136,572	7,392	396,622	102,178	71,230	5,074	178,483	354,836	207,802	12,467	48,552	623,657
1982	247,429	138,899	7,779	394,106	98,013	74,054	5,352	177,419	345,442	212,953	13,131	44,868	616,394
1983	230,102	134,867	7,748	372,717	87,130	70,682	5,245	163,056	317,233	205,549	12,992	40,347	576,120
1984	226,446	134,152	7,676	368,275	84,917	70,644	5,217	160,779	311,363	204,797	12,894	37,541	566,595
1985	222,892	130,060	7,969	360,920	82,365	67,974	5,650	155,988	305,257	198,033	13,619	34,373	551,282
1986	216,188	124,185	8,554	348,927	79,085	64,653	6,110	149,848	295,273	188,837	14,665	31,366	530,141
1987	210,970	119,593	8,379	338,942	75,986	62,476	5,985	144,447	286,955	182,069	14,365	28,331	511,720
1988	207,670	115,186	8,032	330,889	73,577	60,466	5,578	139,621	281,247	175,652	13,610	25,268	495,778
1989	189,225	102,571	7,592	299,388	65,310	54,401	5,236	124,947	254,535	156,972	12,828	21,258	445,592
1990	184,982	94,761	7,149	286,892	59,852	50,668	4,957	115,477	244,782	145,429	12,106	19,098	421,415
1991	178,628	87,917	6,857	273,403	54,420	42,741	4,774	101,936	233,049	130,658	11,631	16,761	392,099
1992	172,909	82,517	6,587	262,014	50,605	38,252	4,557	93,414	223,515	120,769	11,144	14,562	369,989
1993	164,872	76,065	6,275	247,212	46,275	33,574	4,311	84,160	211,147	109,639	10,586	12,550	343,922
1994	159,935	73,054	6,026	239,015	41,701	28,083	4,110	73,895	201,636	101,138	10,136	10,790	323,700
1995	154,961	70,010	5,785	230,756	37,378	22,976	3,917	64,271	192,339	92,986	9,702	9,247	304,274

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APPENDIX J

Smoking Cessatiuon - Nicotine Delivery Devices

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Smoking Cessation - Nicotine Delivery Devices

A. Introduction

Smoking cessation programs started in Stockholm, Sweden, in the early 1950's when health authorities began to warn about alleged dangers associated with smoking. Early cessation programs consisted of pamphlets and counseling to aid the smokers in "kicking the habit." These programs spread to the rest of Europe and the United States in the 1960's. In 1964 the Surgeon General's report on smoking and health was released. This report has dramatically affected the advertising, sales, marketing, and legislation associated with tobacco products in the US. As a result of increasing pressure from the government and anti-smoking groups, smoking cessation has become a growth market since the mid 1980's. The success rates of these programs are measured against an abstinence from smoking, and estimates of the success rate for a particular type of program range anywhere from 6 to 43%. (There is some debate as to how these numbers are being calculated by various agencies such as the American Lung Association and the American Cancer Society.) Current estimates show that the people using smoking cessation products number over 4 million in the US and about 17 million worldwide. Studies show that 75% of these people have returned to smoking within 90 days, and 90% restart smoking within 1 year.

There are numerous different types of smoking cessation programs available today. Included are commercial smoke cessation clinics and/or programs, such as SmokeEnders and Schick Laboratories Smoking Control Centers; non-profit smoke cessation programs conducted by health care associations, such as the American Heart Association and the American Lung Association; acupuncture treatments; hypnosis treatments; retail stop-smoking kits, such as Cigarrest and Life Sign Program; and Nicorette chewing gum. The last of these, Nicorette gum, is the only current smoking cessation method commercially available in the US which utilizes nicotine as a key component of the product. However, other types, such as transdermal nicotine patches, will be commercially available in the near future. The remainder of this discussion will be concerned with nicotine-containing smoking cessation products, particularly those which may be marketed in the future.

B. Financial Aspects

The total smoking cessation industry represents a $300 million market in the US and $600 million worldwide. Nicorette gum comprises a significant percentage of this market in the US - about 35%. Sales of Nicorette gum have doubled from $50 million in 1984 to $102 million in 1990, and sales were predicted to increase by 18% in 1991. The introduction of the transdermal nicotine skin patch is anticipated to provide a significant increase in revenues for the

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smoking cessation industry. Most estimates predict that sales of the skin patch will be $100 million in the US and Western Europe the first year with the potential to increase to $400 million by the end of the decade. The total smoking cessation market is anticipated to increase to $1 billion by the year 2000 in the US and Western Europe. These estimates would also indicate that nicotine-containing products would comprise over 50% of the total market.

C. Current Status

Nicorette gum, for a number of years the only nicotine-containing smoking cessation aid, is marketed in the united state by Marion Merrell Dow. Nicorette was developed in Sweden by Pharmacia Leo, a subsidiary of the government-owned pharmaceutical company, Procordia AB. Currently, Nicorette can be obtained only by prescription in the US, although the lower dose versions can be purchased over the counter in a number of other countries. At least four companies have been in a race to introduce a transdermal nicotine patch in the US in late 1991 or early 1992. The first of these to obtain FDA approval was Nicoderm, a skin patch developed by Alza Co. and marketed by Marion Merrell Dow. Nicoderm's approval on Nov. 8, 1991, was followed quickly on Nov. 27, 1991, by FDA approval for Habritol, a skin patch developed and being marketed by Ciba-Geigy Corp. Approval is also being sought by two additional companies. Warner-Lambert has plans to market a patch developed jointly by Cygnus and Kabi Pharmacia (formerly Pharmacia Leo), while Lederle Laboratories, a subsidiary of American Cyanamid, is seeking approval to market Nicotrol 16 developed by Elan. Interestingly, the Elan patch is already being sold in parts of Europe, and was recently registered in Germany, Italy, Greece, Denmark, and South Korea.

Neither Marion Merrell Dow or Ciba-Geigy have been able to market their products, however, as a consequence of two law suits involving possible patent infringement. Ciba-Geigy filed a lawsuit against Alza and Marion Merrell Dow in a Newark, NJ, district court on Nov. 27, 1991, the same day Ciba-Geigy won FDA approval for Habitrol, while American Cyanamid filed a suit against the same two defendants on Nov. 20, 1991, in US District Court in San Francisco. A federal judge in San Francisco issued a gag order on the case and ordered that Nicoderm not be sold until hearings could be held. To make matters even more complicated Elan has filed a patent infringement suit against Cygnus in May, 1991. It is difficult to predict when any of these products will be marketed and which will be most successful until the legal situation can be straightened out. No matter what, however, it would appear that the transdermal nicotine patch market will at least initially be very crowded. In addition, three more companies, Pierre Fabre, Schering-Plough, and Moleculon Biotech, are working on transdermal skin patches.

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D. Efficacy

How effective might transdermal skin patches prove to be as a smoking cessation device. Two studies were published in 1991 reporting on the efficacy with the Cygnus and Alza patches. The first of these was a report on the Cygnus patch published in the New England Journal of Medicine on Aug. 1, 1991. The study as a double-blind trial which utilized 289 subjects. Half of the subjects (145) were given a nicotine patch, while the remaining half (144) used a placebo patch. Subjects were to use the patch daily for 16 weeks, and follow-up studies were conducted for an additional 36 weeks. The rates of sustained success in the nicotine-patch and placebo-patch groups demonstrated a higher rate of abstinence with the active treatment. The success rate after six weeks was 53% in the nicotine-patch group and 17% in the placebo-patch group. After 12 weeks the success rate was 41% in the nicotine group and 10% in the placebo group. After 52 weeks, 17% of the subjects in the nicotine group and 4% of those in the placebo group continued to abstain from smoking.

A similar study conducted on the Alza patch was published in the Journal of the American Medical Association in December, 1991. This study utilized two different trials utilizing a total of 935 subjects. Trial 1 utilized three doses, 21 mg, 14 mg, and 7 mg patches as well as a placebo, while Trial 2 utilized only the two higher doses as well as the placebo. Subjects wore the patches for six weeks. Successful abstainers were then followed for an additional six weeks using patches with lower and lower doses of nicotine followed by an additional 12 weeks of evaluation with no exposure to nicotine. The results show that after six weeks there was a 61% success rate at the high dose, a 48% success rate at the intermediate dose, and a 27% success rate for the placebo group. These numbers declined to a 39% success rate for the high dose, 27% for the intermediate dose and 16% for the placebo after 12 weeks, and 26% for the high dose, 18% for the intermediate dose, and 12% for the placebo group after 18 weeks.

Although these studies clearly show a statistically different success rate for smoking cessation for subjects using the patch compared to those not using the patch, the success rates are no better then a number of methodologies already available. Data from the US Department of Health and Human Services indicate that one year success rates for Nicorette (combined with behavioral methods), acupuncture, physician programs, rapid smoking, and individual hypnosis, are all at least as good if not better than the data presented above for the Cygnus patch. Nevertheless, because of the relative ease of using the skin patch, it is a reasonable assumption that the product will sell.

E. Products of the Future

Prevailing wisdom suggests that since smokers smoke in order to obtain nicotine, that any method which introduces nicotine through a non-cigarette product will assist a smoker in giving

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up cigarettes. Whether or not this is true is not a relevant issue for PM USA. What is relevant is that people believe it to be true. What is also relevant, however, is that the two types of nicotine-containing smoking cessation aids currently or about to be marketed in the US do not introduce nicotine in an efficient manner. A device which would introduce nicotine efficiently would be an aerosol delivery device. There is definitely some activity in this area, although it may be a while before any attempts are made to market such a product. Kabi Pharmacia has purchased technology developed by Advanced Tobacco Products relating to an aerosol delivery device. In addition there a number of US patents dealing with this type of article (US 4,945,929, US 4,715,387, and US 4,635,651) the first of which was granted to BAT.

What is the prevailing opinion of health authorities regarding nicotine delivery devices? A quote from a recent editorial in the influential British Medical Journal Lancet suggests that the opinion might well not be negative. "Although these nicotine replacement products are marketed as aids to stopping smoking, with further refinement some may also have potential for long-term use and, if permitted, might eventually replace tobacco on the open market...it seems logical to offer either a cleaner product [than a cigarette] or, better still, an acceptable source of more pure, less contaminated nicotine. The principle is the same as that of the UK low-tar programme, albeit a gigantic step - too big it seems for regulatory authorities and health professions in the USA."

If attitudes expressed above become wide-spread among health professionals, it will not be long before nicotine-delivery devices which are both effective and appealing are introduced into the market **with endorsement**. Should this happen, it will clearly become the next wave in the "cigarette" market driven by health concerns. If PM USA is not prepared to participate in this new market, it is possible that the repercussions would be severe.

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APPENDIX K

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APPENDIX K

Resource Allocations
By Program

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Direct Manpower	DEPT TOTAL	DEPT TOTAL	DEPT TOTAL	DEPT TOTAL	DEPT TOTAL	DEPT TOTAL
STRATEGIC GOAL #1	1991	1992	1993	1994	1995	1996
Operations Support	48.90	49.60	42.10	41.80	41.00	40.90
Optical Processing	5.60	3.50	2.50	2.50	2.10	2.10
New Expanded Tobacco	31.50	25.95	19.15	14.45	12.95	12.45
Cast Leaf Program	19.60	22.55	22.90	20.15	17.65	17.65
Improved Primary Program	15.40	22.65	27.15	28.25	22.50	20.50
Environmental Program	12.10	15.95	17.95	17.25	18.80	18.45
Domestic Product Support	21.70	22.85	22.70	22.20	22.20	22.20
International Product Support						
PMUSA	2.90	2.80	2.90	3.20	3.20	3.20
PMPI	17.40	13.55	13.45	13.60	13.55	13.60
Paper Technology (Quality & Consolidation)	5.20	6.30	5.50	5.40	4.90	4.90
Filter R&D (Quality & Consolidation Issues)	2.45	2.65	2.65	1.95	1.45	1.45
Consumer Testing (Support portion)	0.20	0.00	0.00	0.00	0.00	0.00
Process Plant Support	3.50	3.30	4.25	4.10	4.15	4.60
Packaging Quality Improvements	2.80	2.00	2.10	2.00	2.00	1.90
STRATEGIC GOAL #2						
Domestic Product Development	76.70	72.00	74.60	75.60	74.60	75.30
International Product Development						
PMUSA	7.10	6.00	7.00	7.50	9.00	9.00
PMPI	23.60	25.45	25.55	25.40	25.45	25.40
Menthol Programs	8.80	9.60	7.30	5.80	5.20	5.20
Paper Technology (New product issues)	8.70	9.40	7.60	6.90	6.90	6.40
Filter R&D (New product issues)	4.75	5.20	6.00	5.50	5.30	5.30
Project ART (Half-Nic)	2.45	3.50	2.30	0.00	0.00	0.00
New Packaging Concepts	0.40	0.90	1.00	1.10	1.00	1.10
Flavor Research	5.60	3.85	4.35	4.80	4.95	4.95
Consumer Testing	4.80	6.00	5.00	4.80	4.50	4.50
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	21.90	19.90	14.40	14.00	10.30	9.60
Filter R&D (Web Filter; CO Reduction)	7.00	8.10	5.90	5.50	5.50	5.50
Low Tar/High Flavor (Short Term -BOLD)	1.75	0.60	0.60	2.80	2.80	2.80
STRATEGIC GOAL #4						
Project Tomorrow	16.10	16.90	21.80	24.30	25.10	24.05
Paper Technology (Banded Papers)	4.70	4.55	4.85	4.40	2.50	2.30
Ingredients Reduction/Project Natural	3.80	4.60	4.45	4.35	4.65	4.65
I'ntl Reduced Tar & Nicotine	1.20	1.00	1.00	1.00	1.00	1.00
STRATEGIC GOAL #5						
Project Beta	24.75	23.95	25.30	25.25	24.70	24.65
Aerosol Research	4.35	4.80	6.50	8.00	8.00	8.00
Sensory Technology	8.15	11.50	10.50	14.50	16.50	17.50
Tobacco Biochemistry (LBA and TSNA)	30.30	23.70	21.50	19.70	19.50	19.50
Project ART (Long Term)	2.00	0.00	0.00	0.00	0.00	0.00
Computing Systems (Expert Systems, etc.)	2.90	2.90	3.90	3.20	4.70	4.70
Selective Filtration	0.10	0.50	1.00	1.00	1.50	1.50
Combustion Research	0.40	0.30	0.30	0.30	2.60	2.60
Consumer Testing	1.80	2.00	2.00	2.00	2.00	2.00
Biological (Biosensors, etc.)	0.10	1.10	6.60	7.20	7.70	7.70
Plant Tissue Culture	0.00	0.00	2.00	3.00	3.00	3.00
Biochemical Processing	0.00	0.00	0.50	1.00	1.00	1.00
Basic Analytical Research	1.00	0.00	1.00	1.25	6.25	8.25
Techniques for On-Line Monitoring	4.60	5.90	6.90	6.90	7.90	8.90
Robotics	3.40	3.40	3.00	2.00	1.00	1.00
Predictive Maintenance	1.40	3.80	3.80	3.80	3.80	3.80
Catalysis	0.00	1.50	1.50	3.00	4.00	4.00
Encapsulation	0.00	1.50	1.50	0.00	0.00	0.00
Aging Study	0.00	1.00	1.00	0.00	0.00	0.00
Tobp&f Engineering	9.00	9.00	9.00	9.00	9.00	9.00
Direct Allocation	441.85	449.05	447.80	442.70	439.35	439.05
Support	134.15	120.95	122.20	127.30	130.65	130.95
Direct Allocation & Support	576.00	570.00	570.00	570.00	570.00	570.00
Budgeted Resources						
Total PMPI	41.00	39.00	39.00	39.00	39.00	39.00

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Direct Manpower 1996	DEPT TOTAL	Admin Serv	ARD	Biochm	CAD	Chm Res	CTSD	Dev Engr	Filter Dev	Flavor Tech	Paper Develop	PED	PHY	Pro Dev	Recon Tob	Tobp&f	Tob Proc	Exec
STRATEGIC GOAL #1																		
Operations Support	40.90		21.50	6.80		1.00				6.90					1.00		2.50	1.20
Optical Processing	2.10				0.20			0.00					1.60			0.30		
New Expanded Tobacco	12.45						1.50	2.00		0.45			0.00			0.50	8.00	
Cast Leaf Program	17.65		1.00			0.00		1.00		0.80					12.00	0.85	2.00	
Improved Primary Program	20.50		0.50		0.50		3.00	1.00		1.60			3.60			0.50	9.30	0.50
Environmental Program	18.45		3.00	0.50		4.00		1.00		1.80						1.25	6.00	0.90
Domestic Product Support	22.20		1.00				11.50		1.00	2.25		1.50		2.00		2.75		0.20
International Product Support																		
PMUSA	3.20		1.00													2.20		
PMPI	13.60						10.00			0.80				2.00		0.80		
Paper Technology (Quality & Consolidation)	4.90		0.50								3.00					1.40		
Filter R&D (Quality & Consolidation Issues)	1.45								1.00							0.45		
Consumer Testing (Support portion)	0.00															0.00		
Process Plant Support	4.60									0.40						1.20	3.00	
Packaging Quality Improvements	1.90									1.90								
STRATEGIC GOAL #2																		
Domestic Product Development	75.30		1.00			4.00	22.00			2.50		24.00		9.00		9.80	3.00	
International Product Development																		
PMUSA	9.00		1.00			0.20						0.50				4.60	2.70	
PMPI	25.40						7.00			2.20		2.00		14.00		0.20		
Menthol Programs	5.20			0.20		0.00		1.00	1.00	2.70						0.30		
Paper Technology (New product issues)	6.40		1.00	0.30		1.00				0.10	3.00					1.00		
Filter R&D (New product issues)	5.30					1.00			3.00	0.10						1.00		0.20
Project ART (Half-Mic)	0.00			0.00		0.00				0.00						0.00		
New Packaging Concepts	1.10								0.50	0.60								
Flavor Research	4.95		1.00	0.20		2.00				1.55						0.20		
Consumer Testing	4.50					0.00										4.50		
STRATEGIC GOAL #3																		
Paper Technology (Social Acceptability)	9.60		2.00	1.00		1.80					3.00					1.80		
Filter R&D (Web Filter; CO Reduction)	5.50								2.00		1.00		1.00			1.50		
Low Tar/High Flavor (Short Term -BOLD)	2.80			1.50						0.30						1.00		
STRATEGIC GOAL #4																		
Project Tomorrow	24.05		1.00			0.00		0.30	3.50	0.15	4.00		9.00	2.00		1.10	2.50	0.50
Paper Technology (Banded Papers)	2.30		0.30					0.20								1.30		0.50
Ingredients Reduction/Project Natural	4.65		0.20							0.65						0.80		3.00
I'ntl Reduced Tar & Nicotine	1.00															1.00		
STRATEGIC GOAL #5																		
Project Beta	24.65		3.00		0.50	0.00		1.00		0.15			20.00					
Aerosol Research	8.00					2.00							6.00					
Sensory Technology	17.50		4.00	2.00		6.00						1.00				3.00		1.50
Tobacco Biochemistry (LBA and TSNA)	19.50		0.50	18.00		1.00												
Project ART (Long Term)	0.00			0.00		0.00		0.00								0.00		
Computing Systems (Expert Systems, etc.)	4.70				2.00			1.00								0.20		1.50
Selective Filtration	1.50								1.00									0.50
Combustion Research	3.60				1.80	0.00										0.30		0.50
Consumer Testing	2.00											1.00				1.00		
Biological (Biosensors, etc.)	7.70			7.50		0.00												0.20
Plant Tissue Culture	3.00			3.00														
Biochemical Processing	1.00			1.00														
Basic Analytical Research	8.25		0.00															0.25
Techniques for On-Line Monitoring	8.90		7.50	1.00												0.20		0.20
Robotics	1.00							1.00										
Predictive Maintenance	3.80					0.00							3.80					
Catalysis	4.00					4.00												
Encapsulation	0.00					0.00												
Aging Study	0.00																	
Tobp&f Engineering	9.00															9.00		
Direct Allocation	439.05	0.00	59.00	43.00	5.00	28.00	38.00	9.50	13.00	24.90	14.00	28.00	45.00	13.00	13.00	55.00	39.00	11.65
Support	130.95	40.00	3.00	1.00	29.00	1.00	0.00	17.50	0.00	3.10	0.00	1.00	1.00	1.00	0.00	2.00	1.00	30.35
Direct Allocation & Support	570.00	40.00	62.00	44.00	34.00	29.00	38.00	27.00	13.00	28.00	14.00	29.00	46.00	14.00	13.00	57.00	40.00	42.00
Budgeted Resources																		
Total PMPI	39.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	3.00	0.00	2.00	0.00	16.00	0.00	1.00	0.00	0.00

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Direct Manpower 1995	DEPT TOTAL	Admin Serv	ARD	Biochm	CAD	Chm Res	CTSD	Dev Engr	Filter Dev	Flavor Tech	Paper Develop	PED	PHY	Pro Dev	Recon Tob	Tobpaf	Tob Proc	Exec
STRATEGIC GOAL #1																		
Operations Support	41.00		21.50	6.80		1.00				7.00					1.00		2.50	1.20
Optical Processing	2.10				0.20			0.00					1.60			0.30		
New Expanded Tobacco	12.95						1.50	2.00		0.45			0.00			1.00	8.00	
Cast Leaf Program	17.65		1.00			0.00		1.00		0.80					12.00	0.85	2.00	
Improved Primary Program	22.50		2.00		0.50		3.00	1.00		1.60			3.60			0.50	9.80	0.50
Environmental Program	18.80		4.00	0.50		4.00		1.00		1.65						0.75	6.00	0.90
Domestic Product Support	22.20		1.00				11.50		1.00	2.25		1.50		2.00		2.75		0.20
International Product Support																		
PMUSA	3.20		1.00													2.20		
PMPI	13.55						10.00			0.75				2.00		0.80		
Paper Technology (Quality & Consolidation)	4.90		0.50								3.00					1.40		
Filter RAD (Quality & Consolidation Issues)	1.45								1.00							0.45		
Consumer Testing (Support portion)	0.00															0.00		
Process Plant Support	4.15									0.45						1.20	2.50	
Packaging Quality Improvements	2.00									2.00								
STRATEGIC GOAL #2																		
Domestic Product Development	74.60		1.00			3.30	22.00			2.50		24.00		9.00		9.80	3.00	
International Product Development																		
PMUSA	9.00		1.00			0.20						0.50				4.60	2.70	
PMPI	25.45						7.00			2.25		2.00		14.00		0.20		
Menthol Programs	5.20			0.20		0.00		1.00	1.00	2.70						0.30		
Paper Technology (New product issues)	6.90		1.50	0.30		1.00				0.10	3.00					1.00		
Filter RAD (New product issues)	5.30					1.00			3.00	0.10						1.00		0.20
Project ART (Half-Nic)	0.00			0.00		0.00				0.00						0.00		
New Packaging Concepts	1.00								0.50	0.50								
Flavor Research	4.95		1.00	0.20		2.00				1.55						0.20		
Consumer Testing	4.50					0.00										4.50		
STRATEGIC GOAL #3																		
Paper Technology (Social Acceptability)	10.30		2.00	1.00		2.50					3.00					1.80		
Filter RAD (Web Filter; CO Reduction)	5.50								2.00		1.00		1.00			1.50		
Low Tar/High Flavor (Short Term -BOLD)	2.80			1.50						0.30						1.00		
STRATEGIC GOAL #4																		
Project Tomorrow	25.10		2.00			0.00		0.30	3.50	0.20	4.00		9.00	2.00		1.10	2.50	0.50
Paper Technology (Banded Papers)	2.50		0.30					0.40								1.30		0.50
Ingredients Reduction/Project Natural	4.65		0.20							0.65						0.80		3.00
I'ntl Reduced Tar & Nicotine	1.00															1.00		
STRATEGIC GOAL #5																		
Project Beta	24.70		3.00		0.50	0.00		1.00		0.20			20.00					
Aerosol Research	8.00					2.00							6.00					
Sensory Technology	16.50		3.00	2.00		6.00						1.00				3.00		1.50
Tobacco Biochemistry (LHA and TSNA)	19.50		0.50	18.00		1.00												
Project ART (Long Term)	0.00			0.00		0.00		0.00								0.00		
Computing Systems (Expert Systems, etc.)	4.70				2.00			1.00								0.20		1.50
Selective Filtration	1.50								1.00									0.50
Combustion Research	2.60				1.80	0.00										0.30		0.50
Consumer Testing	2.00											1.00				1.00		
Biological (Biosensors, etc.)	7.70			7.50		0.00												0.20
Plant Tissue Culture	3.00			3.00														
Biochemical Processing	1.00			1.00														
Basic Analytical Research	6.25		6.00															0.25
Techniques for On-Line Monitoring	7.90		6.50	1.00												0.20		0.20
Robotics	1.00							1.00										
Predictive Maintenance	3.80					0.00							3.80					
Catalysis	4.00					4.00												
Encapsulation	0.00					0.00												
Aging Study	0.00																	
Tobpaf Engineering	9.00															9.00		
Direct Allocation	439.35	0.00	59.00	43.00	5.00	28.00	38.00	9.70	13.00	25.00	14.00	28.00	45.00	13.00	13.00	55.00	39.00	11.65
Support	130.65	40.00	3.00	1.00	29.00	1.00	0.00	17.30	0.00	3.00	0.00	1.00	1.00	1.00	0.00	2.00	1.00	30.35
Direct Allocation & Support	570.00	40.00	62.00	44.00	34.00	29.00	38.00	27.00	13.00	28.00	14.00	29.00	46.00	14.00	13.00	57.00	40.00	42.00
Budgeted Resources																		
Total PMPI	39.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	3.00	0.00	2.00	0.00	16.00	0.00	1.00	0.00	0.00

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Direct Manpower 1994	DEPT TOTAL	Admin Serv	ARD	Biochm	CAD	Chm Res	CTSD	Dev Engr	Filter Dev	Flavor Tech	Paper Develop	PED	PMY	Pro Dev	Recon Tob	Tobp&f	Tob Proc	Exec
STRATEGIC GOAL #1																		
Operations Support	41.80		22.00	7.30		1.00				6.80					1.00		2.50	1.20
Optical Processing	2.50				0.20			0.40					1.60			0.30		
New Expanded Tobacco	14.45		1.00				1.50	2.00		0.45			0.00			1.00	8.00	0.50
Cast Leaf Program	20.15		2.00			0.00		1.00		0.90					12.00	0.85	3.00	0.40
Improved Primary Program	28.25		4.00		0.50		3.00	2.00		1.85			4.60			0.50	10.80	1.00
Environmental Program	17.25		4.00	0.50		2.00		2.00		1.10						0.75	6.00	0.90
Domestic Product Support	22.20		1.00				11.50		1.00	2.25		1.50		2.00		2.75		0.20
International Product Support																		
PMUSA	3.20		1.00													2.20		
PMPI	13.60						10.00			0.80				2.00		0.80		
Paper Technology (Quality & Consolidation)	5.40		1.00								3.00					1.40		
Filter R&D (Quality & Consolidation Issues)	1.95								1.50							0.45		
Consumer Testing (Support portion)	0.00															0.00		
Process Plant Support	4.10									0.40						1.20	2.50	
Packaging Quality Improvements	2.00									2.00								
STRATEGIC GOAL #2																		
Domestic Product Development	75.60		1.00			3.30	22.00			2.50		24.00		9.00		9.80	3.00	1.00
International Product Development																		
PMUSA	7.50		1.00			0.20						0.50				4.60	1.20	
PMPI	25.40						7.00			2.20		2.00		14.00		0.20		
Menthol Programs	5.80		0.50	0.20		0.00		1.00	1.00	2.80						0.30		
Paper Technology (New product issues)	6.90		1.50	0.30		1.00				0.10	3.00					1.00		
Filter R&D (New product issues)	5.50					1.00			1.00	0.10						1.00		0.40
Project ART (Half-Mic)	0.00			0.00		0.00				0.00						0.00		
New Packaging Concepts	1.10								0.50	0.60								
Flavor Research	4.80		1.00	0.20		2.00				1.40						0.20		
Consumer Testing	4.80				0.30	0.00										4.50		
STRATEGIC GOAL #3																		
Paper Technology (Social Acceptability)	14.00		3.00	1.00		5.00					3.00					1.80		0.20
Filter R&D (Web Filter; CO Reduction)	5.50								2.00		1.00		1.00			1.50		
Low Tar/High Flavor (Short Term -BOLD)	2.80			1.50						0.30						1.00		
STRATEGIC GOAL #4																		
Project Tomorrow	24.30		2.00		0.50	0.00		0.50	3.00	0.20	3.00		9.00	2.00		1.10	2.00	1.00
Paper Technology (Banded Papers)	4.40		0.50					0.60			1.00					1.30		1.00
Ingredients Reduction/Project Natural	4.35									0.55						0.80		3.00
I'ntl Reduced Tar & Nicotine	1.00															1.00		
STRATEGIC GOAL #5																		
Project Beta	25.25		2.50		1.00	0.00		1.50		0.25			20.00					
Aerosol Research	8.00					3.00							5.00					0.00
Sensory Technology	14.50		2.50	2.00	0.50	5.50						1.00				3.00		
Tobacco Biochemistry (LBA and TSNA)	19.70		0.50	18.00		1.00												0.20
Project ART (Long Term)	0.00			0.00	0.00	0.00		0.00								0.00		
Computing Systems (Expert Systems, etc.)	3.20				2.00			1.00								0.20		
Selective Filtration	1.00								1.00									
Combustion Research	0.30					0.00										0.30		
Consumer Testing	2.00											1.00				1.00		
Biological (Biosensors, etc.)	7.20			7.00		0.00												0.20
Plant Tissue Culture	3.00			3.00														
Biochemical Processing	1.00			1.00														0.25
Basic Analytical Research	1.25		1.00															0.20
Techniques for On-Line Monitoring	6.90		5.50	1.00												0.20		
Robotics	2.00							2.00										
Predictive Maintenance	3.80					0.00							3.80					
Catalysis	3.00					3.00												
Encapsulation	0.00					0.00												
Aging Study	0.00																	
Tobp&f Engineering	9.00															9.00		
Direct Allocation	442.70	0.00	58.50	43.00	5.00	28.00	38.00	14.00	13.00	24.55	14.00	28.00	45.00	13.00	13.00	55.00	39.00	11.65
Support	127.30	40.00	3.50	1.00	29.00	1.00	0.00	13.00	0.00	3.45	0.00	1.00	1.00	1.00	0.00	2.00	1.00	30.35
Direct Allocation & Support	570.00	40.00	62.00	44.00	34.00	29.00	38.00	27.00	13.00	28.00	14.00	29.00	46.00	14.00	13.00	57.00	40.00	42.00
Budgeted Resources																		
Total PMPI	39.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	3.00	0.00	2.00	0.00	16.00	0.00	1.00	0.00	0.00

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Direct Manpower 1993	DEPT TOTAL	Admin Serv	ARD	Biochm	CAD	Chm Res	CTSD	Dev Engr	Filter Dev	Flavor Tech	Paper Develop	PED	PMY	Pro Dev	Recon Tob	Tobp&f	Tob Proc	Exec
STRATEGIC GOAL #1																		
Operations Support	42.10		23.00	6.50	0.20	1.00		0.40		6.70					1.00		2.50	1.20
Optical Processing	2.50				0.20								1.60			0.30		0.00
New Expanded Tobacco	19.15		2.00				1.50	2.50		0.55			1.60			1.00	9.00	1.00
Cast Leaf Program	22.90		3.00	0.30		1.00		1.50		0.85					12.00	0.85	3.00	0.40
Improved Primary Program	27.15		4.00		0.60		3.00	1.50		1.95			4.00			0.60	10.80	0.70
Environmental Program	17.95		4.50	0.50		2.00		2.00		1.30						0.75	6.00	0.90
Domestic Product Support	22.70		0.50		1.30		11.50		1.00	2.20		1.50		2.00		2.50		0.20
International Product Support					0.00													0.00
PMUSA	2.90		0.50		0.20											2.20		
PMPI	13.45						10.00			0.65				2.00		0.80		
Paper Technology (Quality & Consolidation)	5.50		1.00								3.00					1.50		0.00
Filter R&D (Quality & Consolidation Issues)	2.65								2.00							0.45		0.20
Consumer Testing (Support portion)	0.00				0.00											0.00		0.00
Process Plant Support	4.25									0.50						1.25	2.50	0.00
Packaging Quality Improvements	2.10									2.10								0.00
STRATEGIC GOAL #2																		
Domestic Product Development	74.60		1.00			2.80	22.00			2.20		24.00		9.00		9.80	3.00	0.80
International Product Development																		0.00
PMUSA	7.00		0.50			0.20						0.50				4.60	1.20	
PMPI	25.55						7.00			2.35		2.00		14.00		0.20		
Menthol Programs	7.30		1.00	0.20		1.00		1.00	1.00	2.80						0.30		0.00
Paper Technology (New product issues)	7.60		2.00	0.30		1.00				0.10	3.00					1.00		0.20
Filter R&D (New product issues)	6.00		0.50			1.00			3.00	0.10						1.00		0.40
Project ART (Half-Wic)	2.30			1.50		0.00				0.30						0.50		0.00
New Packaging Concepts	1.00								0.50	0.50								0.00
Flavor Research	4.35		0.50	0.20		2.00				1.45						0.20		0.00
Consumer Testing	5.00				0.50	0.00										4.50		0.00
																		0.00
STRATEGIC GOAL #3																		
Paper Technology (Social Acceptability)	14.40		3.00	1.00		5.00				0.10	3.00					1.80		0.50
Filter R&D (Web Filter; CO Reduction)	5.90		0.20						2.00		1.00		1.00			1.50		0.20
Low Tar/High Flavor (Short Term -BOLD)	0.60									0.10						0.50		0.00
STRATEGIC GOAL #4																		
Project Tomorrow	21.80		0.50		0.50	2.00		0.50	2.50	0.20	2.00		9.00	2.00		1.10	1.00	0.50
Paper Technology (Banded Papers)	4.85		0.50					0.60			2.00					1.30		0.45
Ingredients Reduction/Project Natural	4.45									0.65						0.80		3.00
I'ntl Reduced Tar & Nicotine	1.00															1.00		0.00
STRATEGIC GOAL #5																		
Project Beta	25.30		1.50		1.00	1.00		1.50		0.30			20.00					0.00
Aerosol Research	6.50					2.00							4.00					0.50
Sensory technology	10.50		1.50	2.50	0.50	2.00						1.00				3.00		0.00
Tobacco Biochemistry (LBA and TSNA)	21.50		0.30	20.00		1.00												0.20
Project ART (Long Term)	0.00			0.00	0.00	0.00		0.00								0.00		0.00
Computing Systems (Expert Systems, etc.)	3.90				2.20			1.50								0.20		0.00
Selective Filtration	1.00								1.00									0.00
Combustion Research	0.30					0.00										0.30		0.00
Consumer Testing	2.00											1.00				1.00		0.00
Biological (Biosensors, etc.)	6.60			6.50		0.00												0.10
Plant Tissue Culture	2.00			2.00														0.00
Biochemical Processing	0.50			0.50														0.00
Basic Analytical Research	1.00		1.00															0.00
Techniques for On-Line Monitoring	6.90		5.00	1.00	0.50											0.20		0.20
Robotics	3.00							3.00										
Predictive Maintenance	3.80		0.00			0.00							3.80					
Catalysis	1.50					1.50												
Encapsulation	1.50					1.50												
Aging Study	1.00		1.00															
Tobp&f-Engineering	9.00															9.00		
Direct Allocation	447.80	0.00	58.50	43.00	7.70	28.00	38.00	16.00	13.00	24.95	14.00	28.00	45.00	13.00	13.00	55.00	39.00	11.65
Support	122.20	40.00	3.50	1.00	26.30	1.00	0.00	11.00	0.00	3.05	0.00	1.00	1.00	1.00	0.00	2.00	1.00	30.35
Direct Allocation & Support	570.00	40.00	62.00	44.00	34.00	29.00	38.00	27.00	13.00	28.00	14.00	29.00	46.00	14.00	13.00	57.00	40.00	42.00
Budgeted Resources					34.00			27.00				29.00						
Total PMPI	39.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	3.00	0.00	2.00	0.00	16.00	0.00	1.00	0.00	0.00

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Direct Manpower 1991	DEPT TOTAL	Admin Serv	ARD	Biochm	CAD	Chm Res	CTSD	Dev Engr	filter Dev	Flavor Tech	Paper Develop	PED	PHY	Pro Dev	Recon Tob	Tobp&f	Tob Proc	Exec
STRATEGIC GOAL #1																		
Operations Support	48.90		20.80	17.15	0.00	0.55				4.70					1.00		4.80	0.70
Optical Processing	5.60				0.10			0.20					5.00			0.30		0.00
New Expanded Tobacco	31.50		3.00		0.20		3.00	4.50		0.85			5.00			1.25	13.00	0.70
Cast Leaf Program	19.60		2.00		0.00			0.80		0.70					12.00	1.00	2.70	0.40
Improved Primary Program	15.40		1.00		0.20		1.50	0.40					1.30			1.00	10.00	0.00
Environmental Program	12.10		4.50		0.20			0.50		0.30						0.50	6.00	0.10
Domestic Product Support	21.70		1.50		1.20		11.50		1.00	1.00		1.50		2.00		2.00		0.00
International Product Support																		0.00
PMUSA	2.90		0.50									0.20				2.20		
PMPI	17.40						15.00			0.40				2.00		0.00		
Paper Technology (Quality & Consolidation)	5.20		1.50								2.00					1.50		0.20
Filter R&D (Quality & Consolidation Issues)	2.45								2.00							0.45		0.00
Consumer Testing (Support portion)	0.20															0.20		0.00
Process Plant Support	3.50				0.60					0.40						1.00	1.50	0.00
Packaging Quality Improvements	2.80									2.00								0.80
																		0.00
STRATEGIC GOAL #2																		
Domestic Product Development	76.70		1.50		0.30	2.10	22.00			5.50		24.00		9.00		9.80	1.50	1.00
International Product Development					0.00													0.00
PMUSA	7.10		1.00		0.30	0.20						0.50				4.60	0.50	
PMPI	23.60						7.00			1.60		1.00		16.00		0.00		
Menthol Programs	8.80		0.50			0.90		3.10	1.00	2.00						0.30	1.00	0.00
Paper Technology (New product issues)	8.70		1.50		0.20	3.00					3.00					1.00		0.00
Filter R&D (New product issues)	4.75		0.50		0.20	0.05			3.00							1.00		0.00
Project ART (Half-Mic)	2.45		0.50	0.65		0.50				0.30						0.50		0.00
New Packaging Concepts	0.40								0.40									0.00
Flavor Research	5.60		0.50		0.00	2.40				2.50						0.20		0.00
Consumer Testing	4.80				0.30											4.50		0.00
																		0.00
STRATEGIC GOAL #3																		
Paper Technology (Social Acceptability)	21.90		2.50	1.20	0.20	10.00				0.60	5.00					1.80		0.60
Filter R&D (Web Filter; CO Reduction)	7.00		0.50						3.00		2.00		0.00			1.50		0.00
Low Tar/High Flavor (Short Term -BOLD)	1.75									1.25						0.50		0.00
STRATEGIC GOAL #4																		
Project Tomorrow	16.10		1.00		0.20	0.35		0.20	1.50	1.25			8.30	2.00		1.10		0.20
Paper Technology (Banded Papers)	4.70		1.00					0.20			2.00					1.30		0.20
Ingredients Reduction/Project Natural	3.80			0.20						0.20						0.80		2.60
I'ntl Reduced Tar & Nicotine	1.20									0.20						1.00		0.00
STRATEGIC GOAL #5																		
Project Beta	24.75		2.00		0.40	0.10		2.00		0.25			20.00					0.00
Aerosol Research	4.35				0.00	1.35							3.00					0.00
Low Tar/High Flavor (long Term)	8.15		3.80			1.35				0.50		1.00				2.00		0.30
Tobacco Biochemistry (LBA and TSNA)	30.30		0.50	29.40		0.20												0.20
Project ART (Long Term)	2.00					0.50		0.50								1.00		0.00
Computing Systems (Expert Systems, etc.)	2.90				2.00			0.70								0.20		0.00
Selective Filtration	0.10								0.10									0.00
Combustion Research	0.40					0.10										0.30		0.00
Consumer Testing	1.80											1.80				1.00		0.00
Biological (Biosensors, etc.)	0.10		0.00			0.10												0.00
Plant Tissue Culture	0.00																	0.00
Biochemical Processing	0.00																	0.00
Basic Analytical Research	1.00		1.00															0.00
Techniques for On-Line Monitoring	4.60		3.50	0.40	0.50											0.20		0.00
Robotics	3.40							3.40										
Predictive Maintenance	1.40												1.40					
Catalysis	0.00																	
Encapsulation	0.00																	
Aging Study	0.00																	
Tobp&f Engineering	9.00															9.00		
Direct Allocation	441.85	0.00	55.00	49.00	7.10	23.75	38.00	16.50	12.00	24.50	14.00	29.00	44.00	13.00	13.00	55.00	41.00	8.00
Support	134.15	42.00	3.00	1.00	26.90	5.25	0.00	11.50	0.00	3.50	0.00	1.00	3.00	2.00	0.00	2.00	1.00	32.00
Direct Allocation & Support	576.00	42.00	58.00	50.00	34.00	29.00	38.00	28.00	12.00	28.00	14.00	30.00	47.00	15.00	13.00	57.00	42.00	40.00
Budgeted Resources																		
Total PMPI	41.00	0.00	0.00	0.00	0.00	0.00	22.00	0.00	0.00	2.00	0.00	1.00	0.00	16.00	0.00	0.00	0.00	0.00

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Direct Manpower 1992	DEPT TOTAL	Admin Serv	ARD	Biochm	CAD	Chm Res	CTSD	Dev Engr	Filter Dev	Flavor Tech	Paper Develop	PRD	PMT	Pro Dev	Recon Tob	Tobpaf	Tob Proc	Exec
STRATEGIC GOAL #1																		
Operations Support	49.60		24.00	11.90	0.20	1.00	0.00			6.80					1.00	0.00	3.50	1.20
Optical Processing	3.50				0.20			0.40					2.60			0.30		0.00
New Expanded Tobacco	25.95		3.00		0.10		1.50	3.20		0.60			2.60			1.25	12.00	1.70
Cast Leaf Program	22.55		3.00	0.10	0.10	0.50		1.60		0.85					12.00	1.00	3.00	0.40
Improved Primary Program	22.65		3.00		0.60		3.00	0.80		1.45			3.00			1.00	9.80	0.00
Environmental Program	15.95		4.50	0.50		1.50		0.90		1.15						0.50	6.00	0.90
Domestic Product Support	22.85		0.50		1.80		11.50		1.00	2.15		1.50		2.00		2.20		0.20
International Product Support																		0.00
PMUSA	2.80		0.50		0.10											2.20		
PMPI	13.55						10.00			0.75				2.00		0.80		
Paper Technology (Quality & Consolidation)	6.30		1.50								3.00					1.50		0.30
Filter RAD (Quality & Consolidation Issues)	2.65								2.00							0.45		0.20
Consumer Testing (Support portion)	0.00				0.00											0.00		0.00
Process Plant Support	3.30				0.20					0.60						1.00	1.50	0.00
Packaging Quality Improvements	2.00									2.00								0.00
STRATEGIC GOAL #2																		
Domestic Product Development	72.00		0.50			2.10	22.00			1.80		24.00		9.00		9.80	2.00	0.80
International Product Development																		0.00
PMUSA	6.00		0.50			0.20						0.50				4.60	0.20	
PMPI	25.45						7.00			2.25		2.00		14.00		0.20		
Menthol Programs	9.60		0.50	0.10		2.00		2.20	1.00	2.50						0.30	1.00	0.00
Paper Technology (New product issues)	9.40		2.00	0.20		3.00				0.10	3.00					1.00		0.10
Filter RAD (New product issues)	5.20		0.50			0.20			3.00	0.10						1.00		0.40
Project ART (Half-Mic)	3.50		0.50	1.50		0.00				1.00						0.50		0.00
New Packaging Concepts	0.90								0.50	0.40								0.00
Flavor Research	3.85				0.10	2.10				1.45						0.20		0.00
Consumer Testing	6.00				0.50	1.00										4.50		0.00
																		0.00
STRATEGIC GOAL #3																		
Paper Technology (Social Acceptability)	19.90		5.00	1.00	0.10	7.00				0.50	4.00					1.00		0.50
Filter RAD (Web Filter; CO Reduction)	8.10		0.20						3.00	0.20	2.00		1.00			1.50		0.20
Low Tar/High Flavor (Short Term -SOLD)	0.60									0.10						0.50		0.00
STRATEGIC GOAL #4																		
Project Tomorrow	16.90		0.50		0.50	1.00		0.50	2.00	0.10			9.00	2.00		1.10		0.20
Paper Technology (Banded Papers)	4.55		0.50					0.40			2.00					1.30		0.35
Ingredients Reduction/Project Natural	4.60			0.20						0.60						0.80		3.00
I'atl Reduced Tar & Nicotine	1.00															1.00		0.00
STRATEGIC GOAL #5																		
Project Beta	23.95		1.00		1.00	0.10		1.50		0.35			20.00					0.00
Aerosol Research	4.80					1.30							3.00					0.50
Sensory Technology	11.50		1.50	4.00	0.50	1.00		0.50				1.00				3.00		0.00
Tobacco Biochemistry (LBA and TSNA)	23.70		0.30	22.00		1.00												0.40
Project ART (Long Term)	0.00			0.00	0.00	0.00		0.00								0.00		0.00
Computing Systems (Expert Systems, etc.)	2.90				2.00			0.70								0.20		0.00
Selective Filtration	0.50								0.50									0.00
Combustion Research	0.30					0.00										0.30		0.00
Consumer Testing	2.00											1.00				1.00		0.00
Biological (Biosensors, etc.)	1.10			1.00		0.00												0.10
Plant Tissue Culture	0.00																	0.00
Biochemical Processing	0.00																	0.00
Basic Analytical Research	0.00																	0.00
Techniques for On-Line Monitoring	5.90		4.50	0.50	0.50											0.20		0.20
Robotics	3.40							3.40										
Predictive Maintenance	3.80		0.00			0.00							3.00					
Catalysis	1.50					1.50												
Encapsulation	1.50					1.50												
Aging Study	1.00		1.00															
Tobpaf Engineering	9.00															9.00		
Direct Allocation	449.85	0.00	59.00	43.00	8.50	28.00	38.00	16.10	13.00	24.80	14.00	28.00	45.00	13.00	13.00	55.00	39.00	11.65
Support	120.95	40.00	3.00	1.00	25.50	1.00	0.00	10.90	0.00	1.20	0.00	1.00	1.00	1.00	0.00	2.00	1.00	30.35
Direct Allocation & Support	570.00	40.00	62.00	44.00	34.00	29.00	38.00	27.00	13.00	26.00	14.00	29.00	46.00	14.00	13.00	57.00	40.00	42.00
Budgeted Resources																		
Total PMPI	39.00	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	3.00	0.00	2.00	0.00	16.00	0.00	1.00	0.00	0.00

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APPENDIX L

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APPENDIX L

Resource Allocations
By Cost Center

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Administrative Services

	Current 1992	1993	1994	1995	1996
STRATEGIC GOAL #1					
Operations Support					
Optical Processing					
New Expanded Tobacco					
Cast Leaf Program					
Improved Primary Program					
Environmental Program					
Domestic Product Support					
International Product Support					
PMUSA					
PMPI					
Paper Technology (Quality & Consolidation)					
Filter R&D (Quality & Consolidation Issues)					
Consumer Testing (Support portion)					
Process Plant Support					
Packaging Quality Improvements					
STRATEGIC GOAL #2					
Domestic Product Development					
International Product Development					
PMUSA					
PMPI					
Menthol Programs					
Paper Technology (New product issues)					
Filter R&D (New product issues)					
Project ART (Half-Nic)					
New Packaging Concepts					
Flavor Research					
Consumer Testing					
STRATEGIC GOAL #3					
Paper Technology (Social Acceptability)					
Filter R&D (Web Filter; CO Reduction)					
Low Tar/High Flavor (Short Term -BOLD)					
STRATEGIC GOAL #4					
Project Tomorrow					
Paper Technology (Banded Papers)					
Ingredients Reduction/Project Natural					
I'ntl Reduced Tar & Nicotine					
STRATEGIC GOAL #5					
Project Beta					
Aerosol Research					
Low Tar/High Flavor (long Term)					
Tobacco Biochemistry (LBA and TSNA)					
Project ART (Long Term)					
Computing Systems (Expert Systems, etc.)					
Selective Filtration					
Combustion Research					
Consumer Testing					
Biological (Biosensors, etc.)					
Plant Tissue Culture					
Biochemical Processing					
Basic Analytical Research					
Techniques for On-Line Monitoring					
Robotics					
Predictive Maintenance					
Catalysis					
Encapsulation					
Aging Study					
Tobp&f Engineering					
Direct Allocation	0.00	0.00	0.00	0.00	0.00	0.00
Support	42.00	40.00	40.00	40.00	40.00	40.00
Direct Allocation & Support	42.00	40.00	40.00	40.00	40.00	40.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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Analytical Research	Current 1992	1993	1994	1995	1996
STRATEGIC GOAL #1					
Operations Support	20.00	24.00	23.00	22.00	21.50	21.50
Optical Processing						
New Expanded Tobacco	3.00	3.00	2.00	1.00		
Cast Leaf Program	2.00	3.00	3.00	2.00	1.00	1.00
Improved Primary Program	1.00	3.00	4.00	4.00	2.00	0.50
Environmental Program	4.50	4.50	4.50	4.00	4.00	3.00
Domestic Product Support	1.50	0.50	0.50	1.00	1.00	1.00
International Product Support						
PMUSA	0.50	0.50	0.50	1.00	1.00	1.00
PMPI						
Paper Technology (Quality & Consolidation)	1.50	1.50	1.00	1.00	0.50	0.50
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development	1.50	0.50	1.00	1.00	1.00	1.00
International Product Development						
PMUSA	1.00	0.50	0.50	1.00	1.00	1.00
PMPI						
Menthol Programs	0.50	0.50	1.00	0.50		
Paper Technology (New product issues)	1.50	2.00	2.00	1.50	1.50	1.00
Filter R&D (New product issues)	0.50	0.50	0.50			
Project ART (Half-Nic)	0.50	0.50				
New Packaging Concepts						
Flavor Research	0.50		0.50	1.00	1.00	1.00
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	2.50	5.00	3.00	3.00	2.00	2.00
Filter R&D (Web Filter; CO Reduction)	0.50	0.20	0.20			
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow	1.00	0.50	0.50	2.00	2.00	1.00
Paper Technology (Banded Papers)	1.00	0.50	0.50	0.50	0.30	0.30
Ingredients Reduction/Project Natural					0.20	0.20
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta	2.00	1.00	1.50	2.50	3.00	3.00
Aerosol Research						
Sensory Technology	3.00	1.50	1.50	2.50	3.00	4.00
Tobacco Biochemistry (LBA and TSNA)	0.50	0.30	0.30	0.50	0.50	0.50
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)	0.00					
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research	1.00		1.00	1.00	6.00	8.00
Techniques for On-Line Monitoring	3.50	4.50	5.00	5.50	6.50	7.50
Robotics						
Predictive Maintenance		0.00	0.00			
Catalysis						
Encapsulation						
Aging Study		1.00	1.00			
Tobp&f Engineering						
Direct Allocation	55.00	59.00	58.50	58.50	59.00	59.00
Support	3.00	3.00	3.50	3.50	3.00	3.00
Direct Allocation & Support	58.00	62.00	62.00	62.00	62.00	62.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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BJM

Biochemical Research	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support	17.15	11.90	6.50	7.30	6.80	6.80
Optical Processing						
New Expanded Tobacco						
Cast Leaf Program		0.10	0.30			
Improved Primary Program						
Environmental Program		0.50	0.50	0.50	0.50	0.50
Domestic Product Support						
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development						
International Product Development						
PMUSA						
PMPI						
Menthol Programs		0.10	0.20	0.20	0.20	0.20
Paper Technology (New product issues)		0.20	0.30	0.30	0.30	0.30
Filter R&D (New product issues)						
Project ART (Half-Mic)	0.65	1.50	1.50	0.00	0.00	0.00
New Packaging Concepts						
Flavor Research			0.20	0.20	0.20	0.20
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	1.20	1.00	1.00	1.00	1.00	1.00
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)				1.50	1.50	1.50
STRATEGIC GOAL #4						
Project Tomorrow						
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural	0.20	0.20				
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology		4.00	2.50	2.00	2.00	2.00
Tobacco Biochemistry (LBA and TSNA)	29.40	22.00	20.00	18.00	18.00	18.00
Project ART (Long Term)		0.00	0.00	0.00	0.00	0.00
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)		1.00	6.50	7.00	7.50	7.50
Plant Tissue Culture			2.00	3.00	3.00	3.00
Biochemical Processing			0.50	1.00	1.00	1.00
Basic Analytical Research						
Techniques for On-Line Monitoring	0.40	0.50	1.00	1.00	1.00	1.00
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	49.00	43.00	43.00	43.00	43.00	43.00
Support	1.00	1.00	1.00	1.00	1.00	1.00
Direct Allocation & Support	50.00	44.00	44.00	44.00	44.00	44.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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Computer Applications

	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support	0.00	0.20	0.20			
Optical Processing	0.10	0.20	0.20	0.20	0.20	0.20
New Expanded Tobacco	0.20	0.10				
Cast Leaf Program	0.00	0.10				
Improved Primary Program	0.20	0.60	0.60	0.50	0.50	0.50
Environmental Program	0.20					
Domestic Product Support	1.20	1.80	1.30			
International Product Support		0.00	0.00			
PMUSA		0.10	0.20			
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)		0.00	0.00			
Process Plant Support	0.60	0.20				
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development	0.30					
International Product Development	0.00					
PMUSA	0.30					
PMPI						
Menthol Programs						
Paper Technology (New product issues)	0.20					
Filter R&D (New product issues)	0.20					
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research	0.00	0.10				
Consumer Testing	0.30	0.50	0.50	0.30		
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	0.20	0.10				
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow	0.20	0.50	0.50	0.50		
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta	0.40	1.00	1.00	1.00	0.50	0.50
Aerosol Research	0.00					
Sensory Technology		0.50	0.50	0.50	0.00	
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)		0.00	0.00	0.00		
Computing Systems (Expert Systems, etc.)	2.00	2.00	2.20	2.00	2.00	2.00
Selective Filtration						
Combustion Research					1.80	1.80
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring	0.50	0.50	0.50			
Robotics						
PRedictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	7.10	8.50	7.70	5.00	5.00	5.00
Support	26.90	25.50	26.30	29.00	29.00	29.00
Direct Allocation & Support	34.00	34.00	34.00	34.00	34.00	34.00
Budgeted Resources	34.00	34.00	34.00	34.00	34.00	34.00
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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Chemical Research	Current 1992	1993	1994	1995	1996
STRATEGIC GOAL #1					
Operations Support	0.55	1.00	1.00	1.00	1.00	1.00
Optical Processing						
New Expanded Tobacco						
Cast Leaf Program		0.50	1.00	0.00	0.00	0.00
Improved Primary Program						
Environmental Program		1.50	2.00	2.00	4.00	4.00
Domestic Product Support						
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2					
Domestic Product Development	2.10	2.10	2.80	3.30	3.30	4.00
International Product Development						
PMUSA	0.20	0.20	0.20	0.20	0.20	0.20
PMPI						
Menthol Programs	0.90	2.00	1.00	0.00	0.00	0.00
Paper Technology (New product issues)	3.00	3.00	1.00	1.00	1.00	1.00
Filter R&D (New product issues)	0.05	0.20	1.00	1.00	1.00	1.00
Project ART (Half-Nic)	0.50	0.00	0.00	0.00	0.00	0.00
New Packaging Concepts						
Flavor Research	2.40	2.10	2.00	2.00	2.00	2.00
Consumer Testing		1.00	0.00	0.00	0.00	0.00
STRATEGIC GOAL #3					
Paper Technology (Social Acceptability)	10.00	7.00	5.00	5.00	2.50	1.80
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4					
Project Tomorrow	0.35	1.00	2.00	0.00	0.00	0.00
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5					
Project Beta	0.10	0.10	1.00	0.00	0.00	0.00
Aerosol Research	1.35	1.30	2.00	3.00	2.00	2.00
Sensory Technology	1.35	1.00	2.00	5.50	6.00	6.00
Tobacco Biochemistry (LBA and TSNA)	0.20	1.00	1.00	1.00	1.00	1.00
Project ART (Long Term)	0.50	0.00	0.00	0.00	0.00	0.00
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research	0.10	0.00	0.00	0.00	0.00	0.00
Consumer Testing						
Biological (Biosensors, etc.)	0.10	0.00	0.00	0.00	0.00	0.00
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance		0.00	0.00	0.00	0.00	0.00
Catalysis		1.50	1.50	3.00	4.00	4.00
Encapsulation		1.50	1.50	0.00	0.00	0.00
Aging Study						
Tobp&f Engineering						
Direct Allocation	23.75	28.00	28.00	28.00	28.00	28.00
Support	5.25	1.00	1.00	1.00	1.00	1.00
Direct Allocation & Support	29.00	29.00	29.00	29.00	29.00	29.00
Budgeted Resources						
		29.00	31.00	32.00	33.00	33.00

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Cigarette Testing Services

	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support						
Optical Processing						
New Expanded Tobacco	3.00	1.50	1.50	1.50	1.50	1.50
Cast Leaf Program						
Improved Primary Program	1.50	3.00	3.00	3.00	3.00	3.00
Environmental Program						
Domestic Product Support	11.50	11.50	11.50	11.50	11.50	11.50
International Product Support						
PMUSA						
PMPI	15.00	10.00	10.00	10.00	10.00	10.00
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development	22.00	22.00	22.00	22.00	22.00	22.00
International Product Development						
PMUSA						
PMPI	7.00	7.00	7.00	7.00	7.00	7.00
Menthol Programs						
Paper Technology (New product issues)						
Filter R&D (New product issues)						
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow						
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	38.00	38.00	38.00	38.00	38.00	38.00
Support	0.00	0.00	0.00	0.00	0.00	0.00
Direct Allocation & Support	38.00	38.00	38.00	38.00	38.00	38.00
Budgeted Resources						
Total PMPI	22.00	17.00	17.00	17.00	17.00	17.00

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

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Development Engineering	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support						
Optical Processing	0.20	0.40	0.40	0.40	0.00	0.00
New Expanded Tobacco	4.50	3.20	2.50	2.00	2.00	2.00
Cast Leaf Program	0.80	1.60	1.50	1.00	1.00	1.00
Improved Primary Program	0.40	0.80	1.50	2.00	1.00	1.00
Environmental Program	0.50	0.90	2.00	2.00	1.00	1.00
Domestic Product Support						
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development						
International Product Development						
PMUSA						
PMPI						
Menthol Programs	3.10	2.20	1.00	1.00	1.00	1.00
Paper Technology (New product issues)						
Filter R&D (New product issues)						
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow	0.20	0.50	0.50	0.50	0.30	0.30
Paper Technology (Banded Papers)	0.20	0.40	0.60	0.60	0.40	0.20
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta	2.00	1.50	1.50	1.50	1.00	1.00
Aerosol Research						
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)	0.50	0.50	0.00	0.00	0.00	0.00
Computing Systems (Expert Systems, etc.)	0.70	0.70	1.50	1.00	1.00	1.00
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics	3.40	3.40	3.00	2.00	1.00	1.00
Predictive Maintenence						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	16.50	16.10	16.00	14.00	9.70	9.50
Support	11.50	10.90	11.00	13.00	17.30	17.50
Direct Allocation & Support	28.00	27.00	27.00	27.00	27.00	27.00
Budgeted Resources	28.00	27.00	27.00	27.00	27.00	27.00
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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Executive

	Current 1992	1993	1994	1995	1996	
STRATEGIC GOAL #1						
Operations Support	0.70	1.20	1.20	1.20	1.20	1.20
Optical Processing	0.00	0.00	0.00			
New Expanded Tobacco	0.70	1.70	1.00	0.50		
Cast Leaf Program	0.40	0.40	0.40	0.40		
Improved Primary Program	0.00	0.00	0.70	1.00	0.50	0.50
Environmental Program	0.10	0.90	0.90	0.90	0.90	0.90
Domestic Product Support	0.00	0.20	0.20	0.20	0.20	0.20
International Product Support	0.00	0.00	0.00			
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)	0.20	0.30	0.00			
Filter R&D (Quality & Consolidation Issues)	0.00	0.20	0.20			
Consumer Testing (Support portion)	0.00	0.00	0.00			
Process Plant Support	0.00	0.00	0.00			
Packaging Quality Improvements	0.00	0.00	0.00			
Project Pact	0.80					
STRATEGIC GOAL #2						
Domestic Product Development	1.00	0.80	0.80	1.00		
International Product Development	0.00	0.00	0.00			
PMUSA						
PMPI						
Menthol Programs	0.00	0.00	0.00			
Paper Technology (New product issues)	0.00	0.10	0.20			
Filter R&D (New product issues)	0.00	0.40	0.40	0.40	0.20	0.20
Project ART (Half-Nic)	0.00	0.00	0.00			
New Packaging Concepts	0.00	0.00	0.00			
Flavor Research	0.00	0.00	0.00			
Consumer Testing	0.00	0.00	0.00			
	0.00	0.00	0.00			
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	0.60	0.50	0.50	0.20		
Filter R&D (Web Filter; CO Reduction)	0.00	0.20	0.20			
Low Tar/High Flavor (Short Term -BOLD)	0.00	0.00	0.00			
STRATEGIC GOAL #4						
Project Tomorrow	0.20	0.20	0.50	1.00	0.50	0.50
Paper Technology (Banded Papers)	0.20	0.35	0.45	1.00	0.50	0.50
Ingredients Reduction/Project Natural	2.60	3.00	3.00	3.00	3.00	3.00
I'ntl Reduced Tar & Nicotine	0.00	0.00	0.00			
STRATEGIC GOAL #5						
Project Beta	0.00	0.00	0.00			
Aerosol Research	0.00	0.50	0.50	0.00		
Sensory Technology	0.30	0.00	0.00		1.50	1.50
Tobacco Biochemistry (LBA and TSNA)	0.20	0.40	0.20	0.20		
Project ART (Long Term)	0.00	0.00	0.00			
Computing Systems (Expert Systems, etc.)	0.00	0.00	0.00		1.50	1.50
Selective Filtration	0.00	0.00	0.00		0.50	0.50
Combustion Research	0.00	0.00	0.00		0.50	0.50
Consumer Testing	0.00	0.00	0.00			
Biological (Biosensors, etc.)	0.00	0.10	0.10	0.20	0.20	0.20
Plant Tissue Culture	0.00	0.00	0.00			
Biochemical Processing	0.00	0.00	0.00			
Basic Analytical Research	0.00	0.00	0.00	0.25	0.25	0.25
Techniques for On-Line Monitoring	0.00	0.20	0.20	0.20	0.20	0.20
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	8.00	11.65	11.65	11.65	11.65	11.65
Support	32.00	30.35	30.35	30.35	30.35	30.35
Direct Allocation & Support	40.00	42.00	42.00	42.00	42.00	42.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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HA

Filter Development	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support						
Optical Processing						
New Expanded Tobacco						
Cast Leaf Program						
Improved Primary Program						
Environmental Program						
Domestic Product Support	1.00	1.00	1.00	1.00	1.00	1.00
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)	2.00	2.00	2.00	1.50	1.00	1.00
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development						
International Product Development						
PMUSA						
PMPI						
Menthol Programs	1.00	1.00	1.00	1.00	1.00	1.00
Paper Technology (New product issues)						
Filter R&D (New product issues)	3.00	3.00	3.00	3.00	3.00	3.00
Project ART (Half-Nic)						
New Packaging Concepts	0.40	0.50	0.50	0.50	0.50	0.50
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)	3.00	3.00	2.00	2.00	2.00	2.00
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow	1.50	2.00	2.50	3.00	3.50	3.50
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration	0.10	0.50	1.00	1.00	1.00	1.00
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	12.00	13.00	13.00	13.00	13.00	13.00
Support	0.00	0.00	0.00	0.00	0.00	0.00
Direct Allocation & Support	12.00	13.00	13.00	13.00	13.00	13.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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JS 11A

Flavor Technology	Current 1992	1993	1994	1995	1996
STRATEGIC GOAL #1					
Operations Support	4.70	6.80	6.70	6.80	7.00	6.90
Optical Processing						
New Expanded Tobacco	0.85	0.60	0.55	0.45	0.45	0.45
Cast Leaf Program	0.70	0.85	0.85	0.90	0.80	0.80
Improved Primary Program		1.45	1.95	1.85	1.60	1.60
Environmental Program	0.30	1.15	1.30	1.10	1.65	1.80
Domestic Product Support	1.00	2.15	2.20	2.25	2.25	2.25
International Product Support						
PMUSA						
PMPI	0.40	0.75	0.65	0.80	0.75	0.80
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support	0.40	0.60	0.50	0.40	0.45	0.40
Packaging Quality Improvements	2.00	2.00	2.10	2.00	2.00	1.90
STRATEGIC GOAL #2						
Domestic Product Development	5.50	1.80	2.20	2.50	2.50	2.50
International Product Development						
PMUSA						
PMPI	1.60	2.25	2.35	2.20	2.25	2.20
Menthol Programs	2.00	2.50	2.80	2.80	2.70	2.70
Paper Technology (New product issues)		0.10	0.10	0.10	0.10	0.10
Filter R&D (New product issues)		0.10	0.10	0.10	0.10	0.10
Project ART (Half-Nic)	0.30	1.00	0.30	0.00	0.00	0.00
New Packaging Concepts		0.40	0.50	0.60	0.50	0.60
Flavor Research	2.50	1.45	1.45	1.40	1.55	1.55
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	0.60	0.50	0.10			
Filter R&D (Web Filter; CO Reduction)		0.20				
Low Tar/High Flavor (Short Term -BOLD)	1.25	0.10	0.10	0.30	0.30	0.30
STRATEGIC GOAL #4						
Project Tomorrow	1.25	0.10	0.20	0.20	0.20	0.15
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural	0.20	0.60	0.65	0.55	0.65	0.65
I'ntl Reduced Tar & Nicotine	0.20					
STRATEGIC GOAL #5						
Project Beta	0.25	0.35	0.30	0.25	0.20	0.15
Aerosol Research						
Sensory Technology	0.50					
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	24.50	24.80	24.95	24.55	25.00	24.90
Support	3.50	3.20	3.05	3.45	3.00	3.10
Direct Allocation & Support	28.00	28.00	28.00	28.00	28.00	28.00
Budgeted						
Total PMPI	2.00	3.00	3.00	3.00	3.00	3.00

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Paper Development	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support						
Optical Processing						
New Expanded Tobacco						
Cast Leaf Program						
Improved Primary Program						
Environmental Program						
Domestic Product Support						
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)	2.00	3.00	3.00	3.00	3.00	3.00
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development						
International Product Development						
PMUSA						
PMPI						
Menthol Programs						
Paper Technology (New product issues)	3.00	3.00	3.00	3.00	3.00	3.00
Filter R&D (New product issues)						
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	5.00	4.00	3.00	3.00	3.00	3.00
Filter R&D (Web Filter; CO Reduction)	2.00	2.00	1.00	1.00	1.00	1.00
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow			2.00	3.00	4.00	4.00
Paper Technology (Banded Papers)	2.00	2.00	2.00	1.00		
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	14.00	14.00	14.00	14.00	14.00	14.00
Support	0.00	0.00	0.00	0.00	0.00	0.00
Direct Allocation & Support	14.00	14.00	14.00	14.00	14.00	14.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

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Product Evaluation	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support						
Optical Processing						
New Expanded Tobacco						
Cast Leaf Program						
Improved Primary Program						
Environmental Program						
Domestic Product Support	1.50	1.50	1.50	1.50	1.50	1.50
International Product Support						
PMUSA	0.20					
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development	24.00	24.00	24.00	24.00	24.00	24.00
International Product Development						
PMUSA	0.50	0.50	0.50	0.50	0.50	0.50
PMPI	1.00	2.00	2.00	2.00	2.00	2.00
Menthol Programs						
Paper Technology (New product issues)						
Filter R&D (New product issues)						
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow						
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology	1.00	1.00	1.00	1.00	1.00	1.00
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing	1.80	1.00	1.00	1.00	1.00	1.00
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	29.00	28.00	28.00	28.00	28.00	28.00
Support	1.00	1.00	1.00	1.00	1.00	1.00
Direct Allocation & Support	30.00	29.00	29.00	29.00	29.00	29.00
Budgeted Resources	29.00	29.00	31.00	31.00	31.00	31.00
Total PMPI	1.00	2.00	2.00	2.00	2.00	2.00

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Physical Research	Current 1992	1993	1994	1995	1996
STRATEGIC GOAL #1					
Operations Support					
Optical Processing	5.00	2.60	1.60	1.60	1.60	1.60
New Expanded Tobacco	5.00	2.60	1.60	0.00	0.00	0.00
Cast Leaf Program						
Improved Primary Program	1.30	3.00	4.00	4.60	3.60	3.60
Environmental Program						
Domestic Product Support						
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development						
International Product Development						
PMUSA						
PMPI						
Menthol Programs						
Paper Technology (New product issues)						
Filter R&D (New product issues)						
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)	0.00	1.00	1.00	1.00	1.00	1.00
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow	8.30	9.00	9.00	9.00	9.00	9.00
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta	20.00	20.00	20.00	20.00	20.00	20.00
Aerosol Research	3.00	3.00	4.00	5.00	6.00	6.00
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance	1.40	3.80	3.80	3.80	3.80	3.80
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	44.00	45.00	45.00	45.00	45.00	45.00
Support	3.00	1.00	1.00	1.00	1.00	1.00
Direct Allocation & Support	47.00	46.00	46.00	46.00	46.00	46.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	47.00	46.00	47.00	49.00	49.00	49.00

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

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Product Development	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support						
Optical Processing						
New Expanded Tobacco						
Cast Leaf Program						
Improved Primary Program						
Environmental Program						
Domestic Product Support	2.00	2.00	2.00	2.00	2.00	2.00
International Product Support						
PMUSA						
PMPI	2.00	2.00	2.00	2.00	2.00	2.00
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development	9.00	9.00	9.00	9.00	9.00	9.00
International Product Development						
PMUSA						
PMPI	14.00	14.00	14.00	14.00	14.00	14.00
Menthol Programs						
Paper Technology (New product issues)						
Filter R&D (New product issues)						
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow	2.00	2.00	2.00	2.00	2.00	2.00
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	13.00	13.00	13.00	13.00	13.00	13.00
Support	2.00	1.00	1.00	1.00	1.00	1.00
Direct Allocation & Support	15.00	14.00	14.00	14.00	14.00	14.00
Budgeted Resources						
Total PMPI	16.00	16.00	16.00	16.00	16.00	16.00

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Reconstituted Tobacco Development	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support	1.00	1.00	1.00	1.00	1.00	1.00
Optical Processing						
New Expanded Tobacco						
Cast Leaf Program	12.00	12.00	12.00	12.00	12.00	12.00
Improved Primary Program						
Environmental Program						
Domestic Product Support						
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support						
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development						
International Product Development						
PMUSA						
PMPI						
Menthol Programs						
Paper Technology (New product issues)						
Filter R&D (New product issues)						
Project ART (Half-Wic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow						
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	13.00	13.00	13.00	13.00	13.00	13.00
Support	0.00	0.00	0.00	0.00	0.00	0.00
Direct Allocation & Support	13.00	13.00	13.00	13.00	13.00	13.00
Budgeted Resources						

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

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Tobacco Processing & Fundamentals	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support						
Optical Processing	0.30	0.30	0.30	0.30	0.30	0.30
New Expanded Tobacco	1.25	1.25	1.00	1.00	1.00	0.50
Cast Leaf Program	1.00	1.00	0.85	0.85	0.85	0.85
Improved Primary Program	1.00	1.00	0.60	0.50	0.50	0.50
Environmental Program	0.50	0.50	0.75	0.75	0.75	1.25
Domestic Product Support	2.00	2.00	2.00	2.00	2.00	2.00
International Product Support						
PMUSA	2.20	2.20	2.20	2.20	2.20	2.20
PMPI	0.00	0.80	0.80	0.80	0.80	0.80
Paper Technology (Quality & Consolidation)	1.50	1.50	1.50	1.40	1.40	1.40
Filter R&D (Quality & Consolidation Issues)	0.45	0.45	0.45	0.45	0.45	0.45
Consumer Testing (Support portion)	0.20	0.20	0.50	0.75	0.75	0.75
Process Plant Support	1.00	1.00	1.25	1.20	1.20	1.20
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development	9.80	9.80	9.80	9.80	9.80	9.80
International Product Development						
PMUSA	4.60	4.60	4.60	4.60	4.60	4.60
PMPI	0.00	0.20	0.20	0.20	0.20	0.20
Menthol Programs	0.30	0.30	0.30	0.30	0.30	0.30
Paper Technology (New product issues)	1.00	1.00	1.00	1.00	1.00	1.00
Filter R&D (New product issues)	1.00	1.00	1.00	1.00	1.00	1.00
Project ART (Half-Nic)	0.50	0.50	0.50	0.00	0.00	0.00
New Packaging Concepts						
Flavor Research	0.20	0.20	0.20	0.20	0.20	0.20
Consumer Testing	4.50	4.50	4.50	4.50	4.50	4.50
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)	1.80	1.80	1.80	1.80	1.80	1.80
Filter R&D (Web Filter; CO Reduction)	1.50	1.50	1.50	1.50	1.50	1.50
Low Tar/High Flavor (Short Term -BOLD)	0.50	0.50	0.50	1.00	1.00	1.00
STRATEGIC GOAL #4						
Project Tomorrow	1.10	1.10	1.10	1.10	1.10	1.10
Paper Technology (Banded Papers)	1.30	1.30	1.30	1.30	1.30	1.30
Ingredients Reduction/Project Natural	0.80	0.80	0.80	0.80	0.80	0.80
I'ntl Reduced Tar & Nicotine	1.00	1.00	1.00	1.00	1.00	1.00
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology	2.00	3.00	3.00	3.00	3.00	3.00
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)	1.00	0.00	0.00	0.00	0.00	0.00
Computing Systems (Expert Systems, etc.)	0.20	0.20	0.20	0.20	0.20	0.20
Selective Filtration						
Combustion Research	0.30	0.30	0.30	0.30	0.30	0.30
Consumer Testing	1.00	1.00	1.00	1.00	1.00	1.00
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring	0.20	0.20	0.20	0.20	0.20	0.20
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering	9.00	9.00	9.00	9.00	9.00	9.00
Direct Allocation	55.00	55.00	55.00	55.00	55.00	55.00
Support	2.00	2.00	2.00	2.00	2.00	2.00
Direct Allocation & Support	57.00	57.00	57.00	57.00	57.00	57.00
Budgeted Resources						
Total PMPI	0.00	1.00	1.00	1.00	1.00	1.00

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Tobacco Processing Development	Current	1992	1993	1994	1995	1996
STRATEGIC GOAL #1						
Operations Support	4.80	3.50	2.50	2.50	2.50	2.50
Optical Processing						
New Expanded Tobacco	13.00	12.00	9.00	8.00	8.00	8.00
Cast Leaf Program	2.70	3.00	3.00	3.00	2.00	2.00
Improved Primary Program	10.00	9.80	10.80	10.80	9.80	9.30
Environmental Program	6.00	6.00	6.00	6.00	6.00	6.00
Domestic Product Support						
International Product Support						
PMUSA						
PMPI						
Paper Technology (Quality & Consolidation)						
Filter R&D (Quality & Consolidation Issues)						
Consumer Testing (Support portion)						
Process Plant Support	1.50	1.50	2.50	2.50	2.50	3.00
Packaging Quality Improvements						
STRATEGIC GOAL #2						
Domestic Product Development	1.50	2.00	3.00	3.00	3.00	3.00
International Product Development						
PMUSA	0.50	0.20	1.20	1.20	2.70	2.70
PMPI						
Menthol Programs	1.00	1.00				
Paper Technology (New product issues)						
Filter R&D (New product issues)						
Project ART (Half-Nic)						
New Packaging Concepts						
Flavor Research						
Consumer Testing						
STRATEGIC GOAL #3						
Paper Technology (Social Acceptability)						
Filter R&D (Web Filter; CO Reduction)						
Low Tar/High Flavor (Short Term -BOLD)						
STRATEGIC GOAL #4						
Project Tomorrow			1.00	2.00	2.50	2.50
Paper Technology (Banded Papers)						
Ingredients Reduction/Project Natural						
I'ntl Reduced Tar & Nicotine						
STRATEGIC GOAL #5						
Project Beta						
Aerosol Research						
Sensory Technology						
Tobacco Biochemistry (LBA and TSNA)						
Project ART (Long Term)						
Computing Systems (Expert Systems, etc.)						
Selective Filtration						
Combustion Research						
Consumer Testing						
Biological (Biosensors, etc.)						
Plant Tissue Culture						
Biochemical Processing						
Basic Analytical Research						
Techniques for On-Line Monitoring						
Robotics						
Predictive Maintenance						
Catalysis						
Encapsulation						
Aging Study						
Tobp&f Engineering						
Direct Allocation	41.00	39.00	39.00	39.00	39.00	39.00
Support	1.00	1.00	1.00	1.00	1.00	1.00
Direct Allocation & Support	42.00	40.00	40.00	40.00	40.00	40.00
Budgeted Resources						
Total PMPI	0.00	0.00	0.00	0.00	0.00	0.00

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APPENDIX M

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APPENDIX M

PM USA R&D Major Program Operations Plans

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OPERATIONAL PLANS

DOMESTIC PRODUCT DEVELOPMENT

1991

REVISION II

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I. **Objectives:** To maximize the potential of existing brand familes by developing line extensions, modifying existing products, and providing products for market segment where PM is unrepresented.

II. **Strategies/Timetables:**

A. Strategy I -- Develop Marlboro line extensions on both Red and Lights

• Marlboro 83mm Box - Test Market	Complete 1st Quarter
• Marlboro Ultra Lights (.75 - .85 T/P)	Test Market
• Marlboro Milds/Mediums (1.35 - 1.45 T/P)	Complete National Launch May 1991
• Marlboro Extra Lights (1.1 - 1.2 T/P)	Complete Shelf Product
• Marlboro Medium 100's (SP/FTB)	June 1992

B. Strategy II -- Develop 80/83mm B&H line extensions in Full Flavor/Lights, Regular/Menthol @ 24.8mm circumference.

• Initial Models	Complete
1. Full Flavor Regular • 1.8 T/P and 1.6 T/P • 80mm/83mm length • 16mg/14mg tar • 24.8mm circumference • B&H 100's Blend	February 1991
2. Full Flavor Menthol • 2.3 T/P, 2.2/2.4 T/P range • .075 M/P, .0645/.085 M/P range • 80mm/83mm length • 24.8m circumference	February 1991

Blends by priority 1) B&H 100; 2) MB4B; 3) N Type

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3. Lights Regular — February 1991

- 1.3 T/P and 1.1 T/P
- 80mm/83mm length
- 24.8mm circumference

4. Lights Menthol

- 1.5 T/P - 1.4/1.6 range
- .09 M/P High .08/.1 range
- .07 M/P Low .06/.08 range

Blends by priority 1) B&H 100 Menthol; 2) MB4B; 3) N Type

5. Consumer Testing — 1st/2nd Quarters

- Regular/Menthol
- Full Flavor/Lights

6. Marketing Research — 1st Quarter

- Packing Type and Size

- National Launch — September 1992

C. Strategy III -- Develop 80/83mm Virginia Slims line extensions in Full Flavor/Lights, Regular/Menthol in 24.8 and 23.0mm circumference

- Initial Models — 1st Quarter
  - Full flavor
    - 1.8 T/P and 1.6 T/P
    - Regular/Menthol
  - Lights
    - 1.3 T/P and 1.1 T/P
    - Regular/Menthol
  - Circumference 23.0/24.0/24.8mm
- Consumer Testing — 2nd Quarter
- Menthol Technology — Ongoing
  - Release compounds
  - Microencapsulation
- National Launch — TBD

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Domestic Product Development 1991 Operational Plans (cont'd.)

D. Strategy IV -- Develop a 70mm and King Size price value non-filter product using cost effective blend

- Model Designs/Initial Prototypes — 1st Quarter

E. Strategy V -- Develop menthol product technology for utilization in new product programs.

- Menthol Interaction Mapping — 1st Quarter
  - T/P and M/P
- Refinement "K" & "N" Type Products — 2nd Quarter
  - Blend Selection
  - Flavors/Casings
  - Monadic Testing
  - Test Market
- Menthol Technology — Ongoing
  - Release Compounds
  - Microencapsulation

F. Strategy VI -- Develop products which incorporate socially acceptable benefits; specifically low aroma/low smoke/low aroma-low smoke.

- Ambrosia II
  - Chemical/Sensory — Ongoing
  - Assessment of Release Compounds — Ongoing
  - Blend Component Aroma Evaluations (25 vs 45 gm basis wt) — 1st Quarter
  - Charcoal Filter Evaluations — 1st Quarter
  - Optimization Monadic Testing — 1st Quarter
  - Assessment of New LSS Paper — Ongoing

G. Strategy VII -- Development of products to address competitive market entries.

- Ambrosia II
  - Chelsea Type — Complete
  - Horizon Type — Shelf Item

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Domestic Product Development 1991 Operational Plans (cont'd.)

- VSSS

Single Wrap Conversion	1st Quarter
Specifications	1st Quarter

H. Strategy VIII -- "Best of the Lowest Development (BOLD)" -- Develop ultra low tar products which utilize proprietary PM technologies, viz., tar reduction, nicotine control, flavor delivery, filter systems, etc., which will provide a competitive edge in the existing U.L. market segment.

- Development -- Best KS prototype to date uses Blend 244, dual CA/paper core concentric filter with a light total blend casing and PM type aftercut. Monadic POL of the KS prototype tested well as compared to competitive brands. Current emphasis remains on improving the 100mm prototype. This work includes blend, flavor, paper and filter modifications. Additionally, development of menthol companions have been completed.

- 100mm Improved Prototypes:

Paper Evaluations (PC Control)	1st Quarter
- Multifex/Albacar Levels	
- Basis Weight	
- Citrate Levels	
- Porosity	
Filter/Plasticizer Evaluations	2nd Quarter
- PM Web	
- CA Web	
- Tela Paper	
- Triacetin/Triethyl Citrate	
Flavor System	1st Quarter
Baseline Menthol Testing	Complete
100mm Improved Prototype Testing	March/April 1991
Qualitative Research	Ongoing
Test Market	June 1991
National Introduction	February 1992

I. Strategy IX -- "Lowest of the Lowest" -- Develop ultra low tar line extensions for the Cambridge/Bristol Family: 1mg KS and 2mg 100.

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- Development -- Preferred prototypes utilize a high ET-type blend with 50% inclusion (BLDET). A 1.8/35000 CA filter has been selected for both 85/100mm products which also incorporate a specified paper (36% $CaCO_3$, 1.7% citrate, 28 g/m^2). Factory trials have been completed at the Cabarrus plant and specifications issued for 1mg KS SP Cambridge/Bristol and 2mg 100 SP Cambridge/Bristol.

- Production Plans

- Start-up Cambridge KS/100	April 28
- Start-up Bristol KS/100	May
- Production Complete	May
- Launch Date	May

J. Strategy X --Support ongoing company business as it affects current production as assistance is required from R&D, Leaf, and Manufacturing locations.

- Marlboro
  - MSA
  - ESB
  - N.E.T.

- IS Evaluation
- BBET Replacement
- RCB Reduction
- Specifications
- New York Marketing Research
- Monadic, POL and HTI Testing

K. Strategy XI -- Implement new technologies as applied to current and new products.

• Filter Technology	Ongoing
• Flavor Technology	Ongoing
• Paper Technology	Ongoing

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Resource Allocation

The current and projected resource allocations are shown below:

A.	Marlboro Line Extension	.5
B.	B&H Line Extension	.5
C.	Virginia Slims Line Extension	.5
D.	70mm and King Size Value Product	.3
E.	Menthol Technology	.2
F.&G.	Products with Social Benefit and Products to Address Competition Entries	.3
H.&I.	Support Company Business	1
J.	Implement New Technology	1
K.	Product Preparation and Testing	1
L.	Support for Low Tar high Flavor BOLD	1
M.	Special Projects	3
N.	Project ART	.7

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PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: Dr. E. B. Sanders Date: September 27, 1991

From: R. Ferguson

Subject: 1991 Operations Support Plans

Attached is a copy of the plans for Operations Support as requested. Certain plan areas have been updated and some, such as environmental, have been deleted since they are not included as part of Operations Support at this time. These changes result in some difference from the original manpower allocations for this program, but this has not been recalculated.

Attachments

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

PACKAGING - ANALYTICAL STUDIES

Program Objective:	To develop qualitative and quantitative analytical techniques to determine the chemistry of packaging materials and to relate the chemical nature of the materials with their sensory characteristics.
Operational Plans:	Packaging materials (inks, boards, finished packs, etc.) that have been proposed for us will be analyzed to determine the qualitative and quantitative nature of the material. Special emphasis will be placed on offset inks and printed materials, on water-based inks and on environmental issues related to product disposal.
Duration of Study:	Material evaluations will be on an as needed basis and is part of an on-going service to Purchasing, Quality Assurance, Packaging Studies and Flavor Technology. This program will also relate to taste/odor/stale research.
Estimated Resources:	This program will require 1.0 persons/year.
Primary Contact:	D. Ingraham

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MARLBORO TASTE/ODOR/STALE

Program Objective: To develop protocol for imparting controlled 'degrees of staleness' to Marlboro 85's (Soft Pack) and to determine whether or not product chemistry can be correlated with the subjective perception of staleness.

Additional studies will relate to the analysis of proposed promotional items related to their potential for contamination of product.

Operational Plans: Marlboro 85's will be subjected to various methods for moving water relative to other of the natural and added tobacco volatiles. Portions of the samples will be reordered to their original moisture content. PED panel smoking results will be evaluated relative to the chemistry of the tobacco.

Samples received from Flavor Technology and/or Purchasing will be analyzed as requested.

Duration of Study: Studies of the chemical composition of Marlboro volatiles relative to the sensory characteristics of the smoke will be evaluated by the end of the 3rd quarter. If the study shows promise, it will be pursued at higher level of resource commitment, if not, the study will be discontinued.

Analyses of promotional items and their impact on product will continue on as requested basis.

Estimated Resources: The study will require the services of 1.0 persons/year through the end of 1991. Additional follow up studies will be required in 1992.

Primary Contact: D. Ingraham

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

ENGINEERING STUDIES

AEROBELL SPRAY STUDY

Program Objective:	To evaluate the Aerobell spray nozzle for applying burley spray to burley strip.
Operational Plan:	A simulated burley spray containing ethyl paraben as a trace was sprayed onto burley strip. The trials compared uniformity of spray application with Aerobell and 1/4 J standard production nozzle.
Duration of Study:	On-going
Estimated Resources:	0.1 person year
Contact Persons:	ARD - W. Ryan Engineering - N. Rowe

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

ENGINEERING STUDIES

METHOPRENE/KABAT

Program Objective:	To monitor and improve the uniformity of methoprene application in Kabat-treated domestic flue-cured and burley tobaccos and qualify independent processors' stemmeries.
Operational Plan:	Methoprene and OV analyses were performed on samples taken at selected points in the Kabat application process lines at Dibrell Bros., J. I. Miller, A. C. Monk, Austin & Co., TPI (East Plant) and J. P. Taylor (#2) stemmeries.
Duration of Study:	Ongoing
Estimated Resources:	0.6 person year
Contact Persons:	ARD - W. Ryan Engineering - E. Bailey, G. Korval

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

CROP PROTECTION AGENTS

Program Objective: To ensure that tobacco product components meet regulatory requirements.

ARD Objective: Provide methodology and measurements of crop protection agents (CPA) as needed.

Operational Plan:

a. Assemble laboratory - equipment personnel, consumables
b. Validate present FTR methodology
c. Improve or replace existing methodology where applicable.
d. Survey Richmond Oriental inventory
e. Expand laboratory capability to address other CPA and regulatory issues.
f. Serve as resource for other PM departments on CPA issues.

Duration of Study: Occupation of laboratory at R&D January 15, 1991. One GC and other laboratory equipment in place. Additional GC in place by May 15. FTR methodology validated by November '91. Oriental testing to begin October '91.

Estimated Resources: 2.3 person/years

Contact Persons: ARD - R. Davis and B. Handy
QA - F. Owen
Leaf Department - D. Hill

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MATERIALS EVALUATION

Program Objective:	To identify the chemical composition of the commercial materials used at the various PM facilities.
Operational Plan:	The chemical evaluation of materials will continue to employ infrared spectroscopy as the major system of analyses. The x-ray fluorescence spectroscopy and other means of evaluating the materials will be used on an as needed basis.
Duration of Study:	The program is ongoing.
Estimated Resources:	The program will use 2.5 persons/year by estimate.
Primary Contact:	Gunars Vilcins

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

ADHESIVES

Program Objective:	To develop analytical specifications for current, incoming adhesive materials and to transmit these specifications and methods to the appropriate QA groups.
Operational Plan:	The chemical nature, the pyrolytic decomposition products and the sensory characteristics will be determined for adhesives that are being or that are proposed for use. Specifications and recommendations of applicability for intended use will be written based on these data.
Duration of Study:	Definition of specifics related to the project including evaluation of supplier technology and the selection and evaluation of analytical and sensory protocol will be completed by the 4th quarter of 1991. Product evaluation and preparation of written specifications for presently used adhesives will be completed by the 4th quarter of 1992.
Estimated Resources:	The program will require 5.0 persons full time with some additional use of ARD resources. This group will also retain responsibility for specifications for any flavor revisions.
Primary Contact:	M. Zimmermann

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PRIMARY IMPROVEMENT - ANALYTICAL RESEARCH STUDIES

Burley Drier

Program Objective: To determine the optimum enthalpy (i.e. temperature and relative humidity) for drying Burley 34 and DBC Blend after application of Burley Spray.

Operational Plan: Burley grade 34 sprayed with a solution of glucose, fructose, and sucrose, and DCB blend sprayed with Burley Spray are dried at different temperatures and relative humidities. Samples are analyzed to determine chemical changes resulting from the drying at different enthalpies. Analyses include the determination of sugars in samples of Burley grade 34 and DBC Blend by ion chromatography and the characterization of the basic and neutral fractions of smoke condensate using gas chromatography/mass spectrometry.

Duration of Study: The sugar and smoke condensate analyses will require 3.25 months each to complete both test plans.

Estimated Resources: The sugar and smoke condensate analyses will require 0.7 person/year and 0.5 person/year, respectively.

Primary Contact: B. Handy, D. Self

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

FLAVOR SPECIFICATIONS - REVISIONS

Program Objective: To develop analytical and sensory specifications for current incoming flavor materials. Transfer specifications and methods to the Flavor Center lab and to any other appropriate groups.

To certify that PMI export flavor materials meet GFO and issue certifications of analysis. Transfer methodology to the Flavor Center QA facilities.

Operational Plan: Certification of PM Domestic and PMI samples will continue as required following a review by Technical Services. Direct Materials specifications and methodology will be transferred to the Flavor Center with analytical back-up by ARD as required. Follow-up meetings will take place with vendors to discuss problems associated with methodology and technical aspects until all suppliers have been visited. Visits with key vendors will continue as required and included collaborative analyses on exchange samples.

Duration of Study: The major efforts for this program should be completed by the end of the first quarter of 1991. Analytical and sensory specifications protocols will be established for new flavor formulations and will be part of an on-going service of ARD.

Estimated Resources: The program will use 4.0 persons through 1st quarter 1991 and an estimated 3.0 persons as an on-going service.

Primary Contact: M. Zimmermann

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

CABARRUS ET

Program Objective:	To monitor uniformity of ET product/process at Cabarrus.
Operational Plan:	Measure selected chemical components; alkaloids (ALK), total reducing sugars (TRS) and humectants (PG, Gly) in feed and ET product from Cabarrus.
Duration of Study:	To continue to submit samples taken biweekly from process.
Estimated Resources:	0.1 man-year
Contact Person:	ARD - Betty Handy Flavor - Howard Spielberg

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

HOGSHEAD/BALE/BOX

Program Objective:	To determine if alternate packaging methods altered the effect of the tobacco aging process during storage, or significantly changed any other measurable quality parameter. Both bright (grades E67, E33 and E9) and burley (grades B57, B34, B3X and B5X) tobaccos were packed into hogsheads (control) for comparison against the PM-80 box and bale containers (test).
Operational Plan:	Measure levels of selected chemical components in samples of tobacco taken from storage containers.
Duration of Study:	Additional samples from this study are scheduled to be received in 1992 and 1997.
Estimated Resources:	None for 1991.
Contact Person:	ARD - Betty Handy QA - Frank Jones

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

RECONSTITUTED FACILITY SUPPORT

Program Objective: Provide chemical analyses to support Plant or R&D reconstituted leaf optimization efforts. Direct or support collaborative studies to support internal and QA laboratory quality efforts.

Operational Plan: Analytical support is generally reactive in nature being driven by Project 1307 and 1309 experiments and studies. There is, of course, significant overlap between Operations concerns in maintaining current product and R&D efforts toward quality improvement, productivity to meet increased demand and available component utilization. On-going studies include reconstituted leaf stability , material balance to support environmental investigations, stem/OTM ratio investigations and flavor modifications. Analyses are generally restricted to those tests for which QA does not have current capability.

Duration of Study: The program is on-going but individual studies terminate, history says that terminated studies frequently re-emerge because of new information or new concerns. Collaborative studies have focused on humectant analysis, this will be extended to other specification component testing including parabens, sorbic acid, phosphorus and ammonia.

Estimated Resources: 1 man/year (this does not include direct C Pilot support or direct support for the Spanish facilities).

Contact Persons: ARD - Bill Ryan
R&D - Dick Uhl and Grant Gellatly

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

COOPERATIVE LEAF STUDIES

Program Objective: To participate in the cooperative tobacco industry program in order to assure that the quality of all new tobacco varieties meet or exceed all requirements as defined by minimum standards program.

ARD Objective: Provide chemical analyses to support PM participation in the Cooperative Tobacco Variety Evaluation Program. Provide chemical analyses to assist in studies supported by the Leaf Agronomists.

Operational Plan: Support for these programs will continue as in recent years. Alkaloids and reducing sugars and nitrogen are the analyses most frequently required.

Duration of Study: The varietal testing in an on-going program, other programs may deal with crop management investigations such as crop spacing, maturity and fertilization.

Estimated Resources: 0.2 person/years.

Contact Persons: ARD - Betty Handy & Chris Ament
Project 2526- Roger Bass
Leaf - David Conner

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SHEET CERTIFICATION

Program Objective:	To define the analyses that are necessary to assure that export sheet materials meet the German Tobacco Ordinance criteria and to transfer the technology to the appropriate QA groups. Back-up analytical services will be provided to these groups on an as-needed basis.
Operational Plans:	Methods development and analyses on production batches of RL and BL will continue to confirm the validity of analytical techniques. Certification of export sheet and transfer of the analytical methodology to appropriate QA labs will begin during second quarter of 1991.
Duration of Study:	Major ARD involvement should be completed by the end of the year under present certification criteria
Estimated Resources:	This program will require 1.5 persons/year through the end of 1991
Primary Contact:	Duane Watson

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

CUSTOMER COMPLAINTS

Program Objective: To provide analytical assistance to QA for customer complaint problems and to support quality improvement programs identified through consumer response.

Operational Plans: Continue analyses of customer complaints samples as required as an on-going service. The evaluations of samples will continue to employ gc and gc-ms for the identification of volatiles in an effort to determine the source of the complaint.

Duration of Study: The program is ongoing.

Estimated Resources: The program will use 1.0 persons/year.

Primary Contact: Dave Ingraham

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

FLAVOR ANALYTICAL SUPPORT

Program Objective: To provide analytical and troubleshooting support to Operations Services, Quality Assurance and Manufacturing in matters involving flavors or flavor-related problems.

Operational Plan: Analytical support and troubleshooting will continue as appropriate upon request. Support areas include out-of-spec. concentrates, preblends, finished flavors and casings, off-flavors or odors, foreign matter, ingredient problems, etc.

Estimated Resources: 0.80

Primary Contact: R. Hale

2021529938

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

NONTOBACCO MATERIALS SUPPORT

Program Objective: To provide analytical and subjective evaluation support for the characterization and qualification of packaging materials, nontobacco cigarette components and other factory materials.

Operational Plan: Investigations will continue in the areas of offset printing, water-based inks/lacquers and other packaging issues dealing with promotional items and threshold level determination of residual solvents. Additionally, proposed new pack overwrap films will be evaluated and new testing procedures will be implemented to examine water and flavor/solvent transmission properties. Subjective panel evaluations will continue as appropriate upon request by Operations Services to qualify and/or characterize any new factory materials such as papers, adhesives, new packaging materials, cleaners, etc. to ensure product subjective integrity. Headspace GC evaluation of packaging materials will continue as required for established and new brands.

Estimated Resources: 4.85

Primary Contacts: B. Mait, G. Yatrakis and R. Hale

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NATURAL GLYCERIN/TRIACETIN

Program Objective: To develop analytical and subjective criteria necessary to qualify and specify all-natural glycerin-based triacetins from multiple vendors for interchangeable use as filter plasticizers.

Operational Plans: Analytical and subjective characterizations of synthetic and natural glycerins and triacetins from various vendors will continue in an effort to identify and classify impurities in "crude" products and verify their absence in production samples with respect to subjective quality. Direction will be provided to vendors as appropriate to try to standardize both glycerin and triacetin to the highest possible subjective quality standards for interchangeable use in Manufacturing.

Estimated Resources: 0.15

Primary Contact: R. Hale

2021529940

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

FLAVOR REVISIONS

Program Objective: To subjectively evaluate revised ingredients, reduced ingredients and/or flavors to qualify same for use in Manufacturing.

Operational Plans: Revised ingredients and flavors and Flavor Center submissions from Operations Services will continue to be evaluated and recommended for approval or further assessment. In addition, the reduced ingredients program will continue in anticipation of either regulatory or consolidation considerations.

Estimated Resources: 1.00

Primary Contact: B. Taylor and M. Garrett

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

FACTORY SUBJECTIVE SUPPORT

Program Objective: Provide subjective panel testing services to Manufacturing, monitor new brand and test market start-ups, troubleshoot subjective problems in filler and cigarettes, and qualify process and direct material changes.

Operational Plans: Subjective monitoring and troubleshooting activities will continue on as needed basis. Subjective testing for qualification of burley dryer replacements, octagonal cylinders, Primary process changes, qualification of Ripper #2 at the MC, Cambridge blend change, new introductions and brand extensions is expected to continue throughout 1991.

Estimated Resources: 0.65

Primary Contact: W. Bell

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

ENVIRONMENTAL ISSUES

Program Objective: To significantly reduce factory environmental emissions by the reduction of ethanol use in PM flavor systems without sacrificing product subjective integrity.

Operational Plans: Work will continue and will be extended to include other brands and flavor systems, in addition to Cambridge aftercut, to reduce ethanol use in flavors. The greatest potential for ethanol reduction is in Burley Top. Overall ethanol reduction potential is 18% for Burley Top alone. Analyses of flavors on filler and cigarettes, and subjective evaluations will continue. POL testing of reduced-ethanol versus current flavor systems is planned to test for subjective parity. In addition, trials of reduced and/or rearranged PG in flavors and casings are to be tested in combination with reduced alcohol.

Estimated Resources: 0.45

Primary Contact: S. Ruziak

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

MARLBORO STANDARDIZATION

Program Objective: To aid in the standardization of manufacturing processes and procedures among PM factories to ensure consistant quality and minimal variation in the Marlboro brand family.

Operational Plans: Current 1991 projections include three unscheduled factory pickups each of Marlboro and Marlboro Lights (all packings) which will be subjectively evaluated by the Marlboro Standard Panel. In addition, a Standard Run IX is tentatively scheduled for early Summer, 1991, in which all manufacturing locations (including Semi-works) will produce Marlboro and Marlboro Lights using the same flavors and, where applicable, the same cigarette and packaging materials. Cigarettes from Standard Run IX will be subjectively tested both internally (Marlboro Standard Panel) and externally (POL). Selected analyses will be performed of ingredients, concentrates, preblends, finished flavors, blend components, finished filler and cigarettes to track production uniformity. Five POL requests have been made to qualify the MS modification. Test cigarettes were produced by both the Semi-works and Stockton Street. These cigarettes will be shipped between the 4th and 25th of March, 1991.

Estimated Resources: 0.80

Primary Contacts: K. Deane and W. Bell

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

SUPPORT TO PROCESSING PLANTS

Program Objective: To develop, evaluate, and/or optimize new additives, specifications and process changes to assure the subjective quality of reconstituted sheet materials.

Operational Plans: POL 3646 (test 3) has been scheduled for an early April ship date to complete the qualification of the evaporator upgrade at Park 500 Line 3. Implementation of dry flavor replacements in RLB at Park 500 is pending installation of flavor metering equipment. Specifications for the preparation of the solid extract of RSJB at the Flavor Center, inventory requirements and addition at Park 500 have been discussed with Technical Services personnel. Methodology for analyses of these materials will be developed by ARD. Tests of the substitutes in RCB are planned for the second quarter of 1991. Semi-works trials of Marlboro with reduced humectant levels in RCB and RL's were completed in January. Test blends are being made to evaluate soluble level effects in RL's. POL testing is scheduled for June, 1991. Large-scale Semi-works trials have been completed for two levels of ASTA replacing RCB in Spanish Marlboro. Subjective qualification of ASTA sheet in Spanish Marlboro will be made by the Richmond Panel. Various flavor formulations in SIVA (Spanish feedstock) are being subjectively evaluated for replacement of RL's in Fortuna. Selected flavor formulations will be used for trials in the Cadiz facility during the first quarter of 1991.

Estimated Resources: 1.10

Primary Contact: J. Swain

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PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: Dr. R. N. Ferguson Date: February 19, 1991

From: R. T. Bass

Subject: Operation Support Information

As per your request I am providing you with the following information for Project 2526, which is Greenhouse Operation and Cooperative Tobacco Variety Evaluation Programs.

1. Project Objective: To produce and provide, green and cured tobacco materials and other botanical materials for R&D, and to participate in the cooperative tobacco industry program to assure that all new tobacco varieties meet or exceed the minimum standards for quality.

2. Operational Plan: Our operations will include continued greenhouse production and continued cooperation with all of the state and federal, and private agricultural research programs currently in progress. These programs usually generate 500 to 600 tobacco samples each year for total alkaloid and sugar analyses. Occasionally other analyses are requested for a small number of samples. We expect the 1991 season to be similar in sample number for analyses.

3. Duration of study: These programs are on-going with each crop year season.

4. Contact Person: Chemical Research - Roger Bass, Project 2526.

/ds

cc:
H. Grubbs
B. Handy

Roger T. Bass

2021529946

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PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: R. Ferguson Date: January 14, 1991

From: C. Wood

Subject: OPERATIONS SUPPORT PLANS FOR 1991-1995

The "Semiworks Support" category of the 1991-1995 resource allocation for Semiworks is predominantly Engineering projects for identified process modifications in the Primary and Make-Pack items in support of new product development, consumer testing and general maintenance and repair of equipment.

As per your request, the following items are project descriptions, schedules and 1991 manning required to support identified programs within the Semiworks over the 1991-1995 period. In addition to the twelve Engineering Support personnel who are dedicated full time to "Semiworks Support" an additional three man years were attributed to this category via production scheduling and production support of this category as project co-ordinators in cooperation with the Engineering Support personnel.

No overtime or temporary help has been included in this plan, but it should be noted that overtime and temporary help account for about 10% of the Semiworks total hours worked for 1990 and is expected to remain at this level for 1991.

PRIMARY

1. Small Scale Primary Upgrade

Improved small batch production process in support of Product and Flavor Development requests where small batches can be utilized to evaluate flavor, blend or component changes for domestic and international markets.
Period; January 1991 to August 1991
Resource; 0.7 person/years Contact; T. Skidmore

2. Cut Filler Dryer Replacement

Replacement of the failing ADT cut filler dryer and control system in Semiworks to support sample production of development tobacco fillers and standard production items for consumer testing.
Period; January 1991 to December 1991
Resource; 1.4 person/years Contact; W. Banks

3. Scrubber Capacity Increase

Replace the existing scrubber system in support of identified equipment installations for Process Development and provide adequate scrubbing

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

capacity for the overall Primary Process and in compliance with the Air Quality Board.
Period; January 1991 to October 1991
Resource; 0.3 person/years Contact; T. Skidmore

4. Primary Reconfiguration

Modifications to existing processes to provide improved quality and provide flexibility to produce smaller batch sizes per request in support of Product Development.
Period; January 1991 to December 1992
Resource; 1.5 person/years Contact; W. Banks

5. Warming Tunnel Evaluation

Evaluation in Semiworks of two warming tunnels for strip tobacco for improved casing or flavor application as requested by Tobacco Materials Division.
Period; October 1990 to July 1991
Resource; 0.3 person/years Contact; W. Banks

6. Spotting Committee

Support manufacturing Spotting Committee by participating in committee meetings, factory tours and efforts to identify and minimize potential contributors to spotting, taste, odor and stale complaints.
Period; January 1991, ongoing
Resource; 0.1 person/years Contact; W. Banks

7. Octagon Cylinder

Transfer of octagonal cylinder design and operational parameters to manufacturing facilities for improved burley spray application uniformity and reduction of off spec. material due to "wet balls".
Period; January 1991 to July 1992
Resource; 0.2 person/years Contact; W. Banks

8. Menthol Retention

Semiworks process evaluations to determine factors and relative impact of various menthol spray application techniques on the efficiency of menthol capture on cut filler and retention.
Period; September 1990 to May 1991
Resource; 0.4 person/years Contact; T. Skidmore

9. Recon In-Line Reordering

Installation of an in line re-ordering cylinder in the Semiworks to provide the capability of ordering recon. tobaccos from intermediate

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storage at 15% O.V. to the GMP target value of 18.5% ± 1% at the point of introduction to the total strip blend silo.
Period; January 1991 to September 1991
Resource; 0.6 person/years Contact; W. Banks

10. Primary Process Control Computer

Replacement and upgrade of the Primary process computer which has lived out its expected application and technology.
Period; January 1991 to April 1991
Resource; 1.0 person/years Contact T. Phan

11. Speed Controller Evaluation

Evaluate state of the art speed controllers and replace some of the aging "Parajust" units at critical locations.
Period; January 1991 through 1992
Resource; 0.6 person/years Contact; T. Phan

12. P&S Dryer Sensor Technology

Install on line temperature and RH sensors in the P&S dryer to support the Process Development "Burley Thermal Treatment Project" for evaluating process conditions and their impact on subjective smoking.
Period; January 1991 through December 1991
Resource; 0.3 person/years Contact; T. Phan

13. Flavor Temperature Controller

Design a system to control flavor temperature gain profiles with better response and less overshooting of targets due to radiant vessel heat transfer.
Period; January 1991 to 3rd quarter 1991
Resource; 0.2 person/years Contact T. Phan

14. Primary Miscellaneous Projects

Miscellaneous project support for Primary operations such as Bright Casing Cylinder exhaust hood modifications, Tobacco temperature and O.V. control at the final strip steaming cylinder, and support to Process Development projects and equipment evaluations such as new E.T. feed systems, maker feed systems, tobacco additives for filling power, etc.
Period; January 1991, ongoing
Resource; 2.9 person/years Contact: C. Wood

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MAKE/PACK

Production Support

Provide one full time engineer in support of Make-Pack machine operations and one part time electronics analyst for troubleshooting daily problems.

In addition to daily operational support, interface with Flavor and Product Development Groups to ensure adequate capacities in terms of production quantity and all configurations needed for sample. Section leader and group leader assisted.
1991-1993 projects

1. High Speed Ringtipper

2,000 cpm additional overtipping capacity with optical inspection to improve and control tipping defects based on historical and forecasted overtip production requirements.
Period; January 1991 to July 1991
Resource; 0.2 person/years Contact; J. Osmalov

2. Tray Filler Replacement

Replace obsolete VTF units with current production HCF units. After 1993, VTF spare parts are no longer available.
Period; January 1991 through 1993
Resource; 0.1 person/years Contact: J. Osmalov

3. FTB pack Opener

Develop and install an automated FTB pack opener to replace the current manual system of opening competitor's and factory samples.
Period; January 1991 to march 1992
Resource; 0.3 person/years Contact; J. Osmalov

4. Plug Combiner Acquisition

In response to Filtration Research and Cigarette Development, install two DAPTC's in support of the Japan and Korea market research for Merit Lights, PM Lights, PM Ultra Lights, and L&M Milds. The second unit is for ongoing Lark development programs in the plug, space, plug category and to provide production capability in Semiworks.
Period; January 1991 to October 1991
Resource; 0.2 person/years Contact; J. Osmalov

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5. On Line Laser Perforation

Increased on line laser capability with a 250 watt unit in support of Product Development's on going development in the recessed filter perforation area on a 100mm cigarette configuration.
Period; January 1991, ongoing
Resource; 0.2 person/years Contact; J. Osmalov

6. Miscellaneous

Installation of a tray filler for our current soft pack opener is planned for 1991 to improve operational efficiency and reduce defects as a function of manual handling.

Return and installation of a KDF2 plugmaker currently on loan to manufacturing is planned for third quarter 1991.

Rebuild and upgrading of a Hinged Lid Packer for 80mm box is planned for the 4th quarter 1991.
Period; January 1991, ongoing
Resource; 0.2 person/years Contact; J. Osmalov

7. Quality Audit

The audit function for Make-Pack quality reports to SES and will undertake several projects in 1991-1992 toward the goal of improving Make-Pack quality at equal or higher production capacities. The audit function will be evaluated in terms of stream-lining the inspection procedure and identifying statistically sound sample sized per job for improving data accuracy and go-no-go decisions for mail out jobs.
Period; January 1991 to 1995
Resource; 1.1 person/years Contact; J. Osmalov

8. Semiworks Equipment Maintenance

Overall support and maintenance of existing equipment, change over to new cigarette or process configurations, troubleshooting of mechanical or electronics systems in Make-Pack.
Period; January 1991, ongoing
Resource; 0.3 person/years Contact; J. Osmalov

cc: J. Higgs
R. Mullins
T. Phan

2021529951

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: Dr. R. Ferguson Date: September 16, 1991

From: R. A. Fenner

Subject: Operations Support - Projections for 1992

Objective:

To examine competitive cigarettes on a regular basis to determine changes in the physical and cigarette smoke characteristics. Two hundred and fifty-three (253) major brands (annual sales ≥ 0.15 billion) and 83 minor brands (annual sales <0.15 billion) are currently tested.

Operational Plan:

Domestic competitive brands with annual sales ≥ 0.15 billion are received monthly from ten cities. All brands are tested monthly for FTC tar and nicotine deliveries, carbon monoxide, total and filter RTD, ventilation, cigarette length, circumference, paper component, permeability, filter length, filter weight, tobacco weight, rod density, total alkaloids and total reducing sugars. Mentholated brands are tested each month for menthol in smoke, filler and filter. Once each quarter, in addition to the analyses listed above, these brands are analyzed for humectants and plasticizer. Filler rod TPM, filter efficiency, static burning time, reconstituted material, expanded tobacco and expanded stems are determined semiannually. Plans include instituting testing of the elemental composition of the cigarette papers for these products. The competitive brands with annual sales <0.15 billion are received semiannually. These brands are tested for FTC tar and nicotine deliveries, carbon monoxide, total RTD, ventilation, cigarette length, circumference, permeability and filter length. Mentholated brands are tested for menthol in smoke.

In addition, salesmen samples, i.e. those cigarettes that the competition may be launching in test markets, are forwarded for a complete analysis.

Resources in Man Years: 6.5

Primary Contact Person: R. A. Fenner (Ext. 3585) or Kathy Mitchell (Ext. 2429) - Operations Center/T2W

2021529952

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Objective: To examine Marlboro King Size on a quarterly basis from each of the Philip Morris factory locations.

Operational Plan: Samples of special runs of Marlboro King Size are received each quarter from each factory location. Standard C.I. analyses are performed on each sample in addition to some special tests. These tests include: humectants, firmness, CV, loose ends, coal removal, sieves, and gas phase analyses.

Resources in Man Years: 2

Primary Contact Person: R. A. Fenner (Ext. 3585) or Kathy Mitchell (Ext. 2429) - Operations Center/T2W

Objective: To determine the variation in tobacco that is utilized in cigarettes by measuring the alkaloids and sugars.

Operational Plan: Samples are received on a weekly basis from each factory location for Marlboro blend and analyzed for alkaloids and reducing sugars. Trends in blending can be documented over time using these data.

Resources in Man Years: 0.5

Primary Contact Person: R. A. Fenner (Ext. 3585) or Joe Garman (Ext. 3505) - Operations Center/T2W

R. A. Fenner, PT

RAF:rrt

cc: Dr. C. Ellis
Mr. J. Garman
Dr. C. Lilly
Ms. K. Mitchell

2021529953

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

RESTRICTED DISTRIBUTION

Richmond, Virginia

To: R. N. Ferguson **Date:** September 16, 1991

From: D. L. Faustini

Subject: **Operation Support: Update of Project 1101 for the Fourth Quarter, 1991**

OBJECTIVE

Provide entomological support in a timely manner to PM USA. Perform research on cigarette beetle (CB) control. Serve as the experts within the company to provide assistance in controlling the CB and other injurious pests at all locations.

STATUS

1. Research Studies

a. Kabat® protection for stems and scrap during 24 months of lab storage

STATUS: Completed and memo written. Materials treated at levels of 3ppm and higher will give 100% CB control.

b. Kabat® fate during tobacco processing

STATUS: Focusing on the expansion process. Data from DIET suggested a 20% methoprene loss during the process. Attempts to do a "mass balance" for methoprene were not successful.

c. Methoprene S-isomer testing

STATUS: Completed and memo written. At equal concentrations, the S-isomer was twice as active as the racemic mixture.

d. CB control agents other than Kabat®

STATUS: Continuing to investigate Nylar® (IGR), and other IGRs and tobacco hornworm purge fluid.

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e. CB physiological differences to methoprene and phosphine

STATUS: Continuing to investigate biological differences between laboratory and field populations regarding methoprene and phosphine.

f. Evaluation of ELISA methoprene test kit

STATUS: Efforts coordinated with members of Project 6902. Two suppliers of kits have been evaluated. As of this date, neither kit has been recommended for use in the field.

2. Support Projects

a. Infestation Control Manual

STATUS: Distribution via TTG has been completed.

b. Customer complaint evaluation from Product Audit Facility

STATUS: Continuing to monitor insect infestations of finished product as related to customer complaints and determine means of prevention.

c. Assist Engineering Department personnel with direct cylinder conditioning (DCC) of various tobaccos

STATUS: Supported work completed at Cabarrus. One hundred percent kill of all life stages was achieved if the conditioner was operated properly.

d. Assist PM USA and PMI as requested

STATUS: Continuing to provide operating support to PM Companies.

PLANS: 4th Quarter of 1991

1. Research Studies

a. Kabat® protection for stems and scrap during 24 months of lab storage

1. Write proposal on field trial.

2021529955

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

b. Kabat® fate during tobacco processing

1. None at this time.

c. Kabat® strategies to achieve application on all tobaccos

1. None at this time.

d. CB control agents other than Kabat®

1. After obtaining toxicity and pyrolysis data, conduct feeding studies using Nylar® on feral CB populations to determine dose response relationships.

e. CB physiological differences to methoprene and phosphine

1. Continue to observe and examine CB populations collected from Kabat® treated tobacco warehouses.

2. As requested, continue to supply USDA with feral CBs from phosphine-treated warehouses.

f. Phytosanitary certification using conditioning for export cut filler (ECF)

1. Examine ECF facilities at Stockton St./Westab Annex for possibly using this procedure.

g. Evaluation of ELISA methoprene test kit

1. Support the personnel in Project 6902 in their evaluations.

2. Support Projects

a. Infestation Control Manual

1. Follow-up visits to international licensees and affiliates as requested by TTG personnel.

2. Review and update the manual.

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

b. Customers complaint evaluation from Product Audit Facility

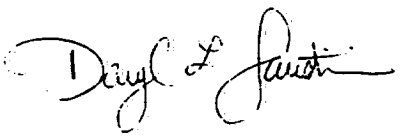
1. Continue to evaluate market customer complaints.

c. Assist PM USA and PMI

1. Provide assistance as requested.

3. Resources: 5.0 persons in Project 1101. Additional resources: 0.25 persons from Analytical Research Division to conduct periodic methoprene residue analyses.

cc: R. Carchman
R. McCuen
E. Sanders
Project 1101
Central Files



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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

RESTRICTED DISTRIBUTION

Richmond, Virginia

To: Dr. R. N. Ferguson Date: September 16, 1991

From: D. M. Teng

Subject: **Operations Support: Update for the Fourth Quarter, 1991**

Nicotine Bioconversion

OBJECTIVE

To determine the feasibility and parameters required to remove nicotine with the microbes in the waste water treatment system.

A. Determine the parameters required for nicotine bioconversion.

STATUS: Study completed and writing of the special report detailing the work is in progress.

B. Determine the fate of ^{14}C-nicotine in a laboratory designed waste water treatment system.

STATUS: Study completed and memo being written. Carbon dioxide accounted for 84% of the label, 15% remained in the reaction liquor and 1% was associated with the solid material in the reaction vessel.

C. Determine if the nicotine in primary clarifier sludge can be removed through recycling efforts.

STATUS: Initiate study during 4th quarter, 1991.

Microbiological Quality Improvement Program (MQIP)

OBJECTIVE

To eliminate, in all products and processes, microbial activities that lead to unacceptable subjective changes.

A. Semiworks Make-Pack Study

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STATUS: Study completed and memo written. No significant "hot spots" were observed.

Tobacco Microbiology in Support of Operations

OBJECTIVE

In response to unanticipated requests, conduct brief studies with well-defined goals in support of all areas of Operations.

A. Hogshead/Box/Bale Storage Study

STATUS: Determine effects on microbial activity (especially mold) of long-term warehouse storage of tobacco in hogsheads, boxes and bales, and in boxes with different liners (with Quality Engineering). Initiated 1986; to continue through 1995.

B. Detailed study of PM80 boxes (with or without plastic sheet on the floor, and with or without Kraft liner at the bottom of the boxes) vs hogsheads using a portion of the 1989 bright and burley tobacco crop.

STATUS: Studies completed and memos written. Bright tobaccos in PM80 boxes without Kraft liners showed visible mold at the bottom part of the boxes (both tobacco and the boxes), and elevated OVs.

C. To determine the type and quantity of mold present on tobacco strips and OTM products with the aim of reducing the potential for these materials to experience active mold growth when placed in long-term storage.

STATUS: Studies completed and information transferred to appropriate individuals.

D. Leaf Processing Facility (LPF) Study

STATUS: During the 1991 bright stemming season, studied the incoming tobacco and devised protocols to sample tobacco on the conveyor belt (or other convenient points) for the zero-time incoming tobacco microbial enumeration. Study completed and memo written. Significant microbial contribution due to crop year, then stemmery and finally grade.

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E. Effect of Temperature/RH/OV/Time on Mold Growth

STATUS: Ongoing efforts; to date laboratory experiments show tobacco does not mold unless the OV is greater than 25%. Expose bright (whole leaf) tobaccos under different moisture/temperature conditions and determine the time it takes for visible mold growth, or under the conditions which mold growth will not take place (study to be completed in December, 1991).

F. Determine the microbial load in bright tobacco casing during storage.

STATUS: Study completed and memo written. No microbes were detected if samples were stored in aseptic containers.

G. Determine the microbial load in burley top casings with and without ethanol (Project Grain).

STATUS: Study completed and memo written. Under good sanitary practice both casings were clean.

Microbiological Methods Development

OBJECTIVE

Improve the efficiency, timeliness and accuracy of the measurements of bacterial, yeast and mold populations, and of indicators of biochemical activity, in tobacco and process solutions.

A. Develop a method to reliably sample large volumes of tobacco, i.e., that found in a hogshead/box in support of the storage studies.

STATUS: Statistical analysis of the data was completed, sampling protocols were devised, and the memo was written.

B. Study different means of tobacco sample preparation to obtain the optimal condition for extracting tobacco for mold enumeration.

STATUS: Study completed, memo written and procedure implemented in the SOP.

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C. Correlate the mold agglutination (MLA) and ergosterol determinations to standard mold plate counts as means of determining mold damage in tobacco.

STATUS: Study completed and memo written. The experimental procedures cannot be used to replace the standard plate count method.

D. Determine feasibility of the "most probable number" (MPN) method for enumeration of bacteria from tobacco.

STATUS: Study completed and memo written. This procedure cannot be used in place of the standard plate count method.

Alternative Preservatives Program

OBJECTIVE

To identify tobacco-identical or otherwise natural antimicrobial preservatives to replace or supplement propylparaben in the processing of RL.

A. Test tetralone (a hop acid known to have antimicrobial properties) from Miller Brewing Company.

STATUS: Tetralone was the most active SEL preservative examined in the Phase I screen.

B. Use multiple combinations of prospective preservatives at concentrations below those necessary for action when present above.

STATUS: Studies deferred in favor of other work.

/mps

cc: R. Carchman
R. McCuen
E. Sanders
Project 1902
Central Files

2021529961

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Strategic Goal Number 1

Export Product Development

Issue - Quality

- Lark Combining Wrap
  - Qualify One Supplier — 1st Qtr., 1992
  - Qualify Second Supplier — 2nd Qtr., 1992

  (R. Lambert)

- Smoking Methodologies
  - Implementation of New ISO Testing Methodology — 1st Qtr., 1992
  - Continue Methodology Standardization and Improvements
  - Continue to Participate in Comparative Smoking Studies

  (J. Hickle)

- Competitive Product Analysis
  - Maintain and Enhance the Usefulness of the Japanese and All Asia CI Reports

  (J. Hickle)

- Competitive Product Testing

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Export Product Development

Issue - Cost/Productivity

Specification Consolidation

- Carbon Consolidation
  - Remove Additives from Coal-Based Carbon — 1st Qtr., 1992
  - Implement Single Coconut-Based PM Spec Carbon — 2nd Qtr., 1992
  - Consumer Test One Carbon Spec for All Products — 4th Qtr., 1992

  (R. Lambert)

- Export Product Standardization
  - Complete Testing in Singapore — 1st Qtr., 1992
  - Complete Testing in GCC — 2nd Qtr., 1992
  - Make Recommendation for Tropical Filler Specification — 2nd Qtr., 1992

  (V. Graff, B. Tierney)

- Cigarette Manufacturing OV
  - Identify Issues — January, 1992
  - Implement Protocol to Establish Baseline OV — 1st Qtr. 1992
  - Make Recommendation for Optimal Cigarette OV Targets — 4th Qtr., 1992

  (V. Graff, B. Tierney)

2021529963

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1992 Product Introduction Plan
Export

Japan	Market Introduction Date
Parliament Lights 100 FTB (K. Poindexter)	January, 1992
Parliament Lights 100 SP (K. Poindexter)	March, 1992
Lark Superlights KS SP/FTB	
Tar Reduction 8mg → 7mg	1st Qtr., 1992
Tar Reduction 7mg → 6mg (R. Lambert)	2nd Qtr., 1992
Lark KS & 100 SP/Box	1st Qtr., 1992
Tar Reduction 15mg → 14mg	
Lark Milds KS SP/Box	
Tar Reduction 11mg → 10mg	
Lark Milds 100 SP/Box	
Tar Reduction 12mg → 11mg (R. Lambert)	
Marlboro 100 FTB (Japan Tobacco) (J. Hickle)	June, 1992
Lark Family - Packaging Graphics Revised (R. Lambert)	July, 1992
Project 41 (K. Poindexter)	August, 1992

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

1992 Product Introduction Plan
Export

Korea	Market Introduction Date
Parliament Lights KS SP (D. Sealey)	January, 1992
Marlboro KS SP/FTB	
Tar Reduction 13.5mg → 12.7mg	1st Qtr., 1992
Tar Reduction 12.7mg → 12.0mg (D. Sealey)	2nd Qtr., 1992
Marlboro Lights KS SP/FTB	
Tar Reduction 9mg → 7mg (D. Sealey)	2nd Qtr., 1992
Merit Lights KS SP (D. Sealey)	April, 1992

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Strategic Goal Number 2

1992 Product Introduction Plan Export

Hong Kong	Market Introduction Date
PM KS SP (Macau, also) (J. Hickle)	January, 1992
Marlboro KS FTB 14's (J. Easley)	March, 1992
Marlboro Medium KS FTB (Macau, also) (J. Easley)	October, 1992
Pan Asian Menthol (J. Hickle)	4th Qtr., 1992

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

1992 Product Introduction Plan
Export

Taiwan	Market Introduction Date
Parliament KS FTB (J. Easley)	March, 1992
B&H Deluxe Lights 100 FTB (J. Easley)	July, 1992
Change in H/W Requirement (J. Easley)	July, 1992
Marlboro KS FTB 10's (J. Easley)	October, 1992
Virginia Blend Product (ex PM Australia) (J. Easley)	

2021529967

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Strategic Goal Number 2

1992 Product Introduction Plan
Export

Singapore	Market Introduction Date
Marlboro Menthol LS FTB 10's (D. Sealey)	February, 1992
Marlboro Lights 100 FTB (D. Sealey)	July, 1992

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Strategic Goal Number 2

1992 Product Introduction Plan
Export

Thailand	Market Introduction Date
Marlboro KS FTB (V. Graff)	April, 1992
Parliament 100 FTB (V. Graff)	November, 1992

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Strategic Goal Number 2

1992 Product Introduction Plan Export

PRC	Market Introduction Date
Marlboro LS → KS FTB Conversion (R. Lambert)	January, 1992
Monterey KS (CNTC) (D. Sealey)	2nd Qtr., 1992
Change in H/W Requirement (D. Sealey)	May, 1992

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Strategic Goal Number 2

1992 Product Introduction Plan
Export

GCC	Market Introduction Date
PM Menthol 100 SP (B. Tierney)	February, 1992
Marlboro LS → KS FTB Conversion (R. Lambert)	June, 1992
Merit Ultra Special KS FTB (B. Tierney)	September, 1992
Chesterfield KS FTB (B. Tierney)	
Chesterfield Lights KS FTB (B. Tierney)	

2021529971

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Strategic Goal Number 2

1992 Product Introduction Plan
Export

EEMA	Market Introduction Date
Marlboro LS → KS FTB Conversion (R. Lambert)	1992

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Strategic Goal Number 2

1992 Product Introduction Plan Export

Iran	Market Introduction Date
Merit Ultra Lights KS FTB (B. Tierney)	January, 1992
Merit 100 SP (B. Tierney)	January, 1992
Printed T/N Numbers Required on Pack (B. Tierney)	

2021529973

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Strategic Goal Number 2

1992 Product Introduction Plan
Export

Levant

PM Filter Kings (Johnny Pack)
(B. Tierney)

Market Introduction Date

April, 1992

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Strategic Goal Number 2

1992 Product Introduction Plan Export

Israel	Market Introduction Date
Parliament LS→ KS FTB Conversion (V. Graff)	February, 1992
Marlboro Lights 100 SP (V. Graff)	March, 1992
Marlboro 100 SP (V. Graff)	March, 1992
Parliament Lights 100 SP (V. Graff)	March, 1992
Change in H/W Requirement (V. Graff)	October, 1992

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1992 Product Introduction Plan
Export

Guam	Market Introduction Date
Marlboro LS → KS FTB Conversion (R. Lambert)	January, 1992
Marlboro Lights KS FTB (J. Easley)	March, 1992
Va. Slims Superslims 100 FTB (J. Easley)	March, 1992
Va. Slims Superslims Menthol 100 FTB (J. Easley)	March, 1992
B&H 100 Menthol FTB (J. Easley)	April, 1992

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Strategic Goal Number 2

1992 Product Introduction Plan
Export

US Duty Free	Market Introduction Date
Marlboro Menthol KS FTB (J. Easley)	March, 1992
Marlboro Medium KS SP (J. Easley)	June, 1992
Marlboro Medium 100 SP (J. Easley)	June, 1992
Parliament Deluxe 100 SP (J. Easley)	June, 1992

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Strategic Goal Number 2

Export Product Development

- Continue to Analyze Key Export Markets
  - Market Segments
  - Market Trends
  - Cigarette Analysis (C.I.)
  - Consumer Testing
- Development of Strategic Product Plans for Each Key Export Market With Regional and Local Marketing Personnel.
- New Products / Brand Extensions
  - Social Acceptability
  - Health Perceptions
  - Price / Value
  - Growing Market Segments

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Strategic Goal Number 3

Export Product Development

- Web Development

  Develop Web Filter Materials

Consumer Testing of Carbon and Non-carbon Web Filters	1st Qtr., 1992

  (K. Poindexter, D. Sealey)

- DeNic / Half Nic

Consumer Testing in Korea	2nd Qtr., 1992

  (D. Sealey)

- Lotus / Ambrosia

  (R. Lambert)

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Activities Not Included in Current Strategic Plan
Export Product Development

Specification Consolidation

- L&M/Chesterfield Production Consolidation
  - Richmond Panel Evaluation — February, 1992
  - Implementation — 2nd Qtr., 1992
    (V. Graff)

- Parliament Casing
  - Implement Recommended Casing Consolidation — January, 1992
    (K. Poindexter)

- Parliament Lights Blend (Korea)
  - Assess Need for Unique Cut Filler Specification — 1st Qtr., 1992
    (D. Sealey)

- Multifilter
  - Implement Use of White Filter Tow — January, 1992

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Activities Not Included in Current Strategic Plan
Export Product Development

New Product Development

Japan

Lark
- Develop Lark Line Extensions at 8 and 6mg tar
- Evaluate PM Engineering High Speed Lark Combiner
  (R. Lambert)

Marlboro
- DIET inclusion in Marlboro - Japan
- Change of Factory, Location for Marlboro - Japan production
- Develop US version of Japanese Marlboro Lights Blend
- Tar Reduction on Japanese Marlboro/Marlboro Lights
  (J. Hickle)

Parliament
- Optimization of Parliament Filter Design
  (R. Lambert/D. Sealey)
- Parliament Ultra Lights
  (K. Poindexter/D. Sealey)

L&M
- Tar Reduction on L&M Milds KS 11mg → 10mg
  (R. Lambert)

PMSL
- Tar Reduction on PMSL KS/100 8mg → 7mg
  (R. Lambert)

Caster-type product
(J. Hickle)

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Activities Not Included in Current Strategic Plan
Export Product Development

New Product Development

Korea

- L&M Lights
  (D. Sealey)
- 3mg 100mm Product
  (D. Sealey)
- Va. Slims KS
  (D. Sealey)
- Merit Ultra Lights
  (D. Sealey)
- Superslims
  (D. Sealey)
- 6mg PMSL 100mm
  (D. Sealey)

Hong Kong

- Merit KS
  (J. Easley)

PRC

- DIET Project
  (D. Sealey)

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Activities Not Included in Current Strategic Plan
Export Product Development

- Export Health Warning Requirement
  (J. Easley)
- Monitoring of QA Analytical and Physical Testing Data for All Current Export Products
- Competitive Product Analysis
  Chemical / Analytical / Physical

2021529983

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Product Development
Affiliates & Licensees

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[redacted]

ASIA

Indonesia
- Project Cornas/Tang

Malaysia
- Project Jupiter
- 2nd Brand

People's Republic of China
- Ningbo DIET Utilization
- Phase I - Monterey Contract Manufacture

Philippines
- Project Omega

[redacted]

2021529985

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LATIN AMERICA

Argentina
- Marlboro Improvement
- L&M Improvement
- Parliament Improvement

Aruba
- Marlboro Tar Reduction

Brazil
- PMSL Development
- Marlboro Improvement
- Oriental Project
- Parliament Lights

Costa Rica
- Derby Ultra Suaves
- Marlboro Improvement
- L&M LS and KS
- Plugwrap Consolidation

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[redacted]

LATIN AMERICA
(continued)

Dominican Republic
- Marlboro Lights Menthol

Ecuador
- Project Rubios

Guatemala
- Free-standing Menthol
- Project Turco

Mexico
- Project Antares
- Project Usher
- Marlboro Flavor Sourcing
- Blend Maintenance

Panama
- Project Andes
- Project Samba

Venezuela
- Ultra Lights
- Project Enano
- Marlboro Improvement

[redacted]

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EEC/EEMA

Pan EEC

- Project Amethist

Hungary, Poland, Yugoslavia

- EEMA BBS

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Paper Technology Plan

September 26, 1991

I. Introduction

The paper technology program has as its overall objective the development of proprietary cigarette papers for new products. The specific applications at this time are: 1) products with reduced sidestream visibility; 2) papers which will control puff count and reduce ash flaking on ultra low delivery cigarettes; 3) papers which will allow control of burn rate for Project Tomorrow; 4) development of filter materials which can be used to make filters with surface areas equivalent to paper filters, but with surface adsorption characteristics similar to cellulose acetate; 5) the determination of specifications for cigarette papers which will be consistent with current cigarette specifications; 6) improved tipping papers; and 7) products for aroma modification of sidestream. Each of these applications will be covered in detail below.

II. Products with Reduced Sidestream Visibility

A. Objectives

1. To develop a proprietary cigarette wrapper which will reduce visible sidestream smoke by at least 70% in a full circumference cigarette, as compared to an appropriate control, with subjectives equivalent to a conventional cigarette by 1992.

2. To develop proprietary cigarette wrappers which will, in addition to reducing sidestream visibility, reduce sidestream odor and irritation by 1995.

The second objective was added in 1990. Little work is planned to take place addressing this objective in 1991. It is anticipated, however, that by the end of 1991 several different systems which provide reduced visibility will be available for product development work. Resources will then be phased into research on technology to give products with reduced odor and irritation.

2021529989

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

B. Introduction and Status

Philip Morris has been working on cigarettes with reduced sidestream visibility for about ten years. Work was initiated with the commercial introduction of a reduced sidestream brand, Passport, in Canada, and has grown in importance during the intervening years as a consequence of the public's growing, although misplaced, concern over passive smoke. Passport utilized a paper manufactured by Ecusta containing 12% magnesium hydroxide. The product had serious subjective problems and was not a commercial success. During the first seven years that R&D was involved in a reduced sidestream program we depended on our two suppliers, Ecusta and Kimberly-Clark, to provide us with low sidestream papers. Three years ago, however, a decision was made to attempt to develop our own low sidestream paper. This was done first of all because our suppliers have not been strikingly successful in providing us with a paper which will achieve our objectives. More importantly, however, it is essential that we develop our own proprietary papers to obtain a clear competitive advantage. In 1989 we developed a slim cigarette with sidestream reduction which met our target and acceptable subjectives. This product utilizes a double wrap system. The outer wrap was developed jointly by PM and Kimberly-Clark. It has a 45 g/m^2 basis weight, contains 35% calcium carbonate with a surface area of 20 m^2 /g, and contains potassium succinate, monoammonium phosphate (MAP) and sodium carboxymethyl cellulose (CMC) as additives. The inner wrap is a thin (18 g/m^2) paper with 3% low surface area calcium carbonate and 2% potassium citrate. This product was introduced nationally in September, 1989. Neither the system used on the slim cigarette nor the Ecusta magnesium hydroxide paper, however, has proved to be satisfactory for a full circumference cigarette. Both wrappers give products with significant subjective problems.

Significant success was achieved in 1990 with the development of a single wrap, calcium carbonate containing wrapper for a full circumference cigarette. This wrapper had a basis weight of 45 g/m^2 , contained 33% Multifex calcium carbonate, and used about 13% mono potassium phosphate as a fluxing agent and had a porosity of 6 Coresta. Charcoal-filtered cigarettes made with this paper gave about 55-60% sidestream visibility reduction, and did reasonably well with respect to liking scores on a POL versus Benson & Hedges Lights. A variation of this paper has also been developed as a single wrap for Superslims to take the place of the current double wrap. There is little more work planned in 1991 with this type of paper; except assist in refining cigarette design acceptability. Most of the effort in this area will be devoted to the synthesis and evaluation of various types of magnesium carbonates as inorganic fillers. In order to achieve the objective of developing a proprietary paper which will reduce sidestream visibility in a full circumference cigarette, we have delineated nine major strategies. These strategies are:

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1. Work with vendor to develop a more acceptable process for the manufacture of a single wrap for Superslims.

2. Optimize a magnesium carbonate (magnesite) paper for a full circumference product through the selection of type and level of fluxing agent(s) to give at least 60% sidestream reduction with minimum sacrifice in subjectives.

3. Develop low sidestream papers based on synthetic forms of magnesium carbonate or mixed magnesium carbonates including magnesite, hydromagnesite, and eitelite.

4. Develop low sidestream papers based on amorphous forms of magnesium carbonate (sol-gel process) using material which can be scaled up to produce commercial quantities.

5. Carry out studies designed to elucidate the mechanism by which magnesium carbonates and mixed magnesium carbonates achieve sidestream visibility reduction.

6. Utilize analysis of mainstream smoke, with emphasis on gas phase, to determine smoke chemistry differences between normal and reduced sidestream models in order to design filters which will result in improved subjectives.

7. Develop unique, cigarette compatible catalyst systems which will result in more complete conversion of sidestream gas phase into carbon oxides in order to reduce sidesream odor and irritation.

8. Utilize the sidestream chamber to fully characterize the analytical chemistry of sidestream smoke from appropriate reduced sidestream prototypes in conjunction with subjective evaluation.

9. Elucidate the chemistry of the pyrolysis/combustion of cigarette paper as a function of additives, temperature, etc.

Each of these strategies will be discussed below. A brief discussion of current status will be given followed by the specific tactics, along with target dates, which will be used to realize each strategy.

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C. Strategies and Tactics

1. Strategy Number 1 - Optimize the single wrap for Superslims to achieve an average of 70% sidestream visibility reduction and maintain the current tar delivery target. September, October, 1991.

a. Status

A single wrap was developed for Virginia Slims Superslims utilizing high basis weight paper technology. This proprietary Philip Morris paper gives 70% sidestream visibility reduction and offers the potential for both cost and manufacturing advantages. The paper has a basis weight of ~53 g/m^2 , a Coresta porosity of 10.5, an inorganic filler consisting of 27% to 33% Multifex calcium carbonate, and is coated with 10.5% mono potassium phosphate. Preliminary specifications and tolerances were established for this paper using modeling studies for chalk and phosphate levels. Mill runs made in December 1990 were used to determine the porosity spec. Currently, the base sheet is being produced in Spotswood and shipped to the Ancram mill for coating. The specifications will be finalized when the paper can be coated on line at Spotswood. The initial shipments of single wrap were made to 11.5 Coresta target, which was changed to 10.5 Coresta when factory pick-ups gave less than the desired 70% visibility reduction. QA methods for the various analyses required have been established.

The performance of the production paper has not matched that of the paper used to set porosity specifications, despite the fact that the two lots of paper showed agreement in critical paper parameters such as porosity, basis weight, and phosphate level. It is hypothesized that two papers with similar Coresta permeability could have different internal structure which could possibly affect the gas diffusional characteristics of the papers. To test this hypothesis, a study has been initiated to characterize the internal structure of paper. Two techniques are being used; mercury intrusion and oxygen diffusivity.

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The mercury intrusion technique provides information on the volume intruded into the pores of various sizes. This technique has previously been used to relate the static burn rate of the cigarette to the internal pore volume of the cigarette paper. The technique appears to be reproducible in the smaller pore diameter range (<5 microns). Results obtained to date do not conclusively suggest a relationship between the mercury porosimetry data and the performance of the two Superslim papers, but they do indicate some differences. Based on a limited number of analyses, the experimental paper which gave higher puff counts and visibility reductions showed higher pore volume in the 0.1-5μ diameter pores than the production paper.

The other technique which is being explored to explain the performance of the two Superslim papers involves direct measurement of the oxygen diffusion through the paper. The instrument to be used is capable of measuring diffusion of various gases through papers and films under controlled conditions. If mercury intrusion and/or oxygen diffusion analyses suggest that the differences in the internal structure of paper could affect the cigarette performance, the critical paper parameters may have to be redefined.

There are several potential advantages to the use of a single wrap. Manufacturing is simplified without the need to run two bobbins of paper simultaneously on the maker, and the machines can be run at a higher speed. A cost reduction for material is achieved, with potential savings of 16-20 cents per thousand cigarettes, after Kimberly-Clark's final process is in place. In addition, because this paper is more porous than the previous Superslims outer wrap, perforation of the paper is no longer necessary. Consequently, the three perforators previously in use can be removed. One additional advantage was also achieved: recycling tobacco. The double wrapped cigarette could not be put through the ripper to recover tobacco.

b. Tactics and Timetables

1. Complete mercury intrusion analysis of new Superslim papers - October, 1991.

2. Obtain oxygen diffusion rate of various cigarette papers - November, 1991.

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3. Initiate handsheet study to identify various papermaking process parameters that could impact the internal structures of paper - December, 1991

4. Determine why the experimental paper used to set initial porosity specifications for the single wrap burned slower than the first two millruns of production paper - Fourth quarter, 1991.

5. Evaluate single wrap containing processing aids from first on-line phosphate addition at Spotswood - September, October, 1991.

6. Test and duplicate the 10 cm^2 Coresta clamp suitable for narrow, non-porous paper - Fourth quarter, 1991.

7. Obtain additional standards suitable for General Analytical to transfer the appropriate method of analysis to QA. The new QA instrument will include monopotassium phosphate and calcium carbonate level in the analysis - October, 1991.

8. Conduct additional round-robin testing for phosphate and Coresta permeability measurements between KC and PM laboratories - Fourth quarter, 1991.

9. Evaluate single wrap for burn rate and sidestream reduction from on-line production at Spotswood. Communicate results to Kimberly-Clark - Fourth quarter, 1991.

10. Determine final acceptable tolerances in phosphate level for production papers after KC implements the use of the new size press at Spotswood - November, 1991.

c. Resource Allocations

Professionals	0.30
Technicians	0.30
Total	0.60

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2. **Strategy Number 2 - Optimize the magnesite paper for a full circumference product through the selection of type and level of fluxing agent(s) to give at least 60% sidestream reduction with minimum sacrifice in subjectives by first quarter 1992.**

a. Status

Among the most promising inorganic fillers investigated to date for reduced sidestream papers are various compositions and morphologies of magnesium carbonate. The chemistry of magnesium carbonate is complex, and many phases exist. Several crystalline phases of magnesium carbonate and mixed magnesium carbonates have been synthesized by members of the Chemical Research Division; some of these have given encouraging sidestream visibility results. The crystalline phase magnesite ($MgCO_3$) has proven most useful to date. This mineral form of magnesium carbonate is not a commercial product and it was initially examined as a synthetic material at Philip Morris. (Two patent applications on the use of magnesite are pending.) Subsequently, a natural source of excellent purity magnesite was located. Production of tonnage quantities of ground Baymag magnesite suitable for use as a paper filler has been achieved. This work involved a two-step process: (1) initial reduction in size from rocks to a coarse sand by means of impaction crushing at Industrial Crushing (Cambridge, Ohio) and then (2) final reduction in size from a coarse sand to a fine powder by processing through an impact (hammer) mill at Midwest Custom Services, Inc. (Fort Wayne, Indiana). Development of the source of magnesite and its processing and papermaking are collaborative efforts between Philip Morris and Ecusta under a confidentiality agreement.

PM representatives participated in an Ecusta paper mill run with Baymag magnesite on February 26, 1991. During the mill run ~1,000 lbs. each of four papers were produced: (a) 55 g/m² paper with a binary filler system (magnesite and calcium carbonate) at ~8 Coresta, (b) 55 g/m² paper with a binary filler system at ~5-6 Coresta, (c) 45 g/m² paper with a ternary filler system (magnesite, calcium carbonate and the gel form of magnesium hydroxide) at ~5-6 Coresta, and (d) 45 g/m² paper with a binary filler system at ~5 Coresta. The binary paper at 45 g/m² basis weight had only 30%, rather than the targeted 40%, total filler. A lesser amount of a 45 g/m² paper with a ternary filler system at a lower porosity also was produced. Ecusta has provided us with quantities of each type of paper both sized and unsized. The sized papers were treated with solutions containing tripotassium citrate and sucrose (at two different levels of potassium), perforated to 110 Coresta and cut to 26.5 mm width for the preparation of cigarettes in the Semiworks.

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Two sets of cigarettes were initially made with the magnesite papers from Ecusta's mill run. Four papers were sized by Ecusta with citrate, sucrose, and, in one case, citric acid. These models gave mainstream tar deliveries ranging from 7.3 mg to 9.7 mg. The two 55 g/m^2 papers burned faster than the two 45 g/m^2 papers, while giving slightly lower tar per puff. Visibility reductions ranged from 42% to 62%. The same four base papers also were coated in-house with 6-7% potassium succinate. Cigarettes made with these papers gave higher sidestream reductions (57-67%).

Recently a number of different solutions have been sized on magnesite papers including sodium succinate, dibasic potassium phosphate, monobasic potassium pimelate, potassium succinate/pimelic acid, potassium succinate/glucose, potassium succinate/fructose, potassium succinate/monobasic potassium phosphate and potassium succinate/CMC/MAP. Although only preliminary results have been obtained with cigarette models made from these papers, some of the initial subjective evaluations have been encouraging.

A second 6,000 lb. batch of Baymag magnesite has now been ground. This filler will be used to prepare additional mill run paper at Ecusta in October, 1991. The resultant paper then will be available to prepare cigarettes for outside evaluation.

In September, 1991, a report was issued by Sue Tafur which reviews the mechanisms of sidestream reduction (PM Acc. No. 91-033). It was noted that common characteristics of reduced sidestream papers include higher basis weight and relatively low porosity. These papers are thought to function by forming a barrier to the concentrated vapor which emanates from cigarettes to form the visible sidestream smoke aerosol. The observation of heavy staining on the inside of reduced sidestream cigarette papers is consistent with barrier formation and indicates that an increased amount of smoke is condensed inside the cigarette rod. It has been hypothesized that the re-pyrolysis of additional smoke condensate within the cigarette rod may change ratios of smoke phases and hence subjective response. An investigation of this hypothesis is planned since it may help us improve subjectives for cigarettes with magnesite papers.

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b. Strategies

Four strategies have been developed to achieve the objective. These strategies are:

A. Optimize current Ecusta magnesite papers with respect to sidestream reduction and subjectives by examining various paper additives.

B. Conduct development studies to optimize full-circumference cigarettes with existing magnesite papers.

C. Investigate potential improved magnesite papers.

D. Determine if increased smoke condensate within the cigarette rod is related to negative sensory attributes of cigarettes with magnesite papers.

Tactics for carrying out these strategies are outlined below.

c. Tactics and Timetable

A. **Optimize current Ecusta magnesite papers with respect to sidestream reduction and subjectives by examining various paper additives.**

1. Complete an investigation of the relationships among potassium level, sidestream reduction and subjective acceptability for currently available Ecusta papers using potassium succinate and potassium citrate (*3rd quarter, 1991*).

2. Develop analytical methods suitable for the characterization of magnesite papers with different combinations of fillers and chemical additives (*3rd and 4th quarters, 1991*).

3. Select optimum paper(s) and cation level and screen a variety of salts (monobasic potassium succinate, dibasic potassium succinate, monobasic potassium phosphate, tribasic potassium citrate, potassium gluconate, dipotassium glucose-1-phosphate, potassium and sodium acetate, tribasic sodium citrate and sodium fumarate) for subjective response and sidestream reduction. Investigate the effect of combinations of additives (e.g.

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dibasic potassium succinate and monobasic potassium phosphate) (*3rd and 4th quarters, 1991*).

4. Investigate the effect of auxiliary additives such as sugars, soluble starch and acids on subjective acceptability and sidestream reduction (*3rd and 4th quarters, 1991*).

5. Examine the relationship of subjective acceptability (especially "bitterness") and pH of sizing solutions (*4th quarter, 1991*).

6. Conduct an analytical/subjective study to compare matched reduced sidestream cigarette models made with selected papers to determine if magnesite papers exhibit any characteristics which can be attributed to "bitter" taste (*4th quarter, 1991*).

B. **Conduct development studies to optimize full-circumference cigarettes with existing magnesite papers.**

1. Prepare models with 55 g/m^2 binary and 45 g/m^2 ternary papers (*3rd and 4th quarters, 1991*).

2. Select optimum tar/puff (*3rd quarter, 1991*).

3. Investigate different filter configurations (*3rd quarter, 1991*).

4. Develop flavor systems on selected model(s) (*4th quarter, 1991*).

5. Determine if the subjective evaluations of magnesite paper cigarette models are affected by "aging" (*3rd and 4th quarters, 1991*).

(a) Obtain subjective evaluations on selected "older" magnesite cigarette models which have been stored in the cold room for comparison to previous results.

(b) Conduct a subjective tracking study using magnesite cigarette models made in August and September, 1991.

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C. **Investigate potential improved magnesite papers.**

1. Examine lower basis weight magnesite paper configurations (*3rd quarter, 1991, and continuing*).

2. Examine combinations and levels of inorganic fillers for magnesite papers to optimize SS reduction, ash appearance, streaking and subjectives (*3rd and 4th quarters, 1991*).

3. Prepare additional magnesite papers at the University of Maine and Ecusta (*3rd quarter, 1991, and continuing*).

D. **Determine if increased smoke condensate within the cigarette rod is related to negative sensory attributes of cigarettes with magnesite papers.**

1. Investigate the effect on subjective response of smoke condensate reapplied to cigarettes (*3rd quarter, 1991*).

2. Determine if negative subjectives can be attributed to the particulate or vapor phase of smoke (*3rd quarter, 1991*).

3. Determine if correlations exist among quantity of smoke condensate on the inside of reduced SS cigarette papers, and subjectives (*4th quarter, 1991*).

4. If results warrant additional study, identify and obtain quantitive analyses as needed and explore cigarette constructions which address subjectives issues identified in the preliminary studies (*4th quarter, 1991, and continuing*).

c. Resource Allocations

Professionals	0.60
Technicians	0.40
Total	1.00

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3. **Strategy Number 3 - Develop low sidestream papers based on forms of magnesium carbonate or mixed magnesium carbonates including magnesite, hydromagnesite, and eitelite.**

a. Status

Among the most promising inorganic fillers investigated to date for reduced sidestream papers are various types of magnesium carbonates. The chemistry of magnesium carbonate is extremely complex, and many phases exist. In addition the use of sol-gel methods (see below) permit the preparation of amorphous, or nanocrystalline, materials which have particularly interesting properties. Although these sol-gel materials appear to be the optimum forms of magnesium carbonate with regard to subjectives, a number of crystalline phases, particularly magnesite and eitelite, give reasonable subjectives using cigarettes hand-made from hand sheets, and are much easier to prepare in quantities necessary to obtain machine-made paper.

Collaboration between Philip Morris and Ecusta, under a confidentiality agreement, has led to significant progress in locating and preparing a natural source of magnesite ("true $MgCO_3$ ") of excellent purity for evaluation. Production has now been achieved of tonnage quantities of ground Baymag magnesite, suitable for use as a paper filler. This work involved a two-step process: (1) initial reduction in size from rocks to a coarse sand by means of impaction crushing at Industrial Crushing (Cambridge, Ohio); and (2) final reduction in size from a coarse sand to a fine powder by processing through an impact (hammer) mill at Midwest Custom Services, Inc. (Fort Wayne, Indiana). Data obtained from hand sheets using Baymag magnesite made at both Ecusta and PM have been used to specify two papers to be made in a mill run in late February at Ecusta. Both a binary filler (magnesite and calcium carbonate) and a ternary filler (magnesite, calcium carbonate, and the gel form of magnesium hydroxide) will be used. These papers will then be utilized for product development work on prototypes machine-made with magnesite papers.

Several crystalline phases of magnesium carbonate and mixed magnesium carbonates have been synthesized by members of the Chemical Research Division, some of which have given encouraging preliminary results. In particular, compounds having varying ratios of hydromagnesite to magnesium hydroxide have been prepared. The compound eitelite also has been prepared.

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b. Tactics and Timetables

(1) Optimize prototypes machine-made from magnesite papers for taste characteristics (using different sizing agents, including organic acids, and different filters) in configurations that will give about 55-70% sidestream reduction - 2nd quarter, 1991.

(2) Prepare cigarette paper at the University of Maine incorporating Baymag magnesite as the sole filler - 2nd quarter, 1991.

(3) Prepare Baymag magnesite having a median particle size of less than one micron at Midwest Custom Services, Inc. for evaluation of its properties - 2nd quarter, 1991.

(4) Evaluate alternate synthesis of magnesite to determine if it can be run without contamination problems in RSA equipment - February, 1991.

(5) If the alternate synthesis can be run at RSA, make large scale run (100-200 pounds) at RSA in March, 1991. If the alternate synthesis is not appropriate, locate new facilities for synthetic magnesite - May, 1991.

(6) Pending further subjective evaluations, plan for the large-scale synthetic preparation of eitelite - 2nd quarter, 1991.

(7) Prepare co-precipitated mixtures of calcium carbonate and magnesium hydroxide/basic magnesium carbonate at atmospheric pressure. A matrix design will be utilized to examine variations in the nature and ratios of starting materials (magnesium hydroxide and calcium oxide) and other experimental conditions - 3rd quarter, 1991.

(8) Pending evaluation of sidestream visibility reductions and subjectives achieved with these fillers, plan for the large-scale synthesis of the best product from this study - 4th quarter, 1991.

(9) Prepare synthetic magnesite cigarette paper at the University of Maine and compare machine-made prototypes using these papers to prototypes made using Baymag magnesite paper - 4th quarter, 1991.

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c. Resource Allocations

Professionals	1.35
Technicians	1.75
Total	3.10

4. Strategy Number 4 - Develop low sidestream papers based on amorphous and/or nanocrystalline forms of magnesium carbonate or mixed magnesium carbonates (via sol-gel or related process) using materials and procedures which can be scaled-up to produce commercial quantities by July, 1992, and investigate new methods for the preparation of these types of compounds.

a. Status

Initial work with the sol-gel preparation of a "magnesium carbonate" using a methanolic system gave a material which, when incorporated into hand sheets followed by hand-making cigarettes, resulted in prototypes with excellent sidestream reduction and subjectives extremely close to those of a conventional cigarette. Two specific problems were encountered with this synthesis. The first was that the throughput of the procedure was quite low. Because of the limited solubility of the starting material in methanol, 100 ml of reaction mixture produced only 0.5 g of product. The second problem was encountered in making paper. Not only was the retention of this material in the paper low, but drainage times were excessively long.

A considerable amount of work has been devoted to surmounting the first of these two problems. The synthesis of a magnesium carbonate gel can now be carried out in aqueous medium, and the throughput has been improved by more than a factor of 5. Alternate routes have also been developed, both at PM and at NY Poly, which give considerably higher throughputs. We are currently in the process of evaluating many of these materials in hand-made cigarettes for both sidestream reduction and subjectives. It is expected that a few materials will be identified in the near future which can be investigated with regard to suitability for scale-up.

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Approaches to solving the problems regarding making paper are now being developed. It was recently pointed out by Dr. David Kraske of the University of Maine that low retention and poor drainage are phenomena which are inconsistent. Work in the hand sheet lab tends to indicate that these materials gel on top of the hand sheet as it is being formed. This finding is consistent with the fact that cellulose is a known gelation agent. General approaches which might be attempted to solve these problems are to alter pH, increase ionic strength, form the gels in the presence of cellulose fibers, and design the synthesis of these materials to increase particle size or to decrease the size of the hydration sphere. Fundamental studies on the properties of these materials such as morphology, particle size, and zeta potentials, will have to be carried out before a choice can be made as to which approaches will be the most fruitful.

Lastly, other methods for the preparation of sol-gel type materials will be investigated, although it is likely that this work will not be initiated until early 1992.

b. Tactics and Timetable

(1) Evaluate current methods of synthesis to determine which methods lend themselves to scale up - first quarter, 1991.

(2) Evaluate properties (composition, morphology, particle size, zeta potential, paper making properties) of sol-gel particles - second quarter, 1991.

(3) Evaluate synthesized material on hand-made cigarettes for chemical and morphological constitution, sidestream reduction and subjectives - second quarter, 1992.

(4) Devise improved methods to make papers from these materials - third quarter, 1991.

(5) Initiate contact with appropriate chemical companies to begin discussions which will lead to preparation(s) of the identified material on a pilot scale - fourth quarter, 1991.

(6) Make machine made cigarettes and evaluate smoke chemistry, subjectives, and aging - date to be determined.

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(7) Use alternative solvents to control particle morphology - third quarter, 1991.

(8) Modify conditions in the aqueous sol-gel route and the methyl magnesium carbonate route (temperature, reaction time) to obtain particles which have improved paper making properties - fourth quarter, 1991.

(9) Examine aging effects on the particles and on the papers made using these particles - third quarter, 1991.

(10) Examine spray drying to obtain particles - first quarter, 1992.

(11) Continue development of analytical techniques to characterize sols, gels, particles, and paper compositions - continuing.

(12) Examine filler and filler/fluxing agent and filler/fluxing agent/paper systems to determine the effects caused by thermal treatments - fourth quarter, 1992.

c. Resource Allocations

Professionals	5.10
Technicians	1.05
Total	6.15

5. Strategy Number 5 - Carry out studies designed to elucidate the mechanism by which magnesium carbonates and mixed magnesium carbonates achieve sidestream visibility reduction.

a. Status

The understanding of mechanisms of sidestream reduction continues to be incomplete. In order to provide a basis for further work in this area, the status of proposed hypotheses, relevant data, and ideas or speculations concerning possible mechanisms was recently compiled in a special report (Accession #91-033). The proposed hypotheses were placed into five categories and a general consensus for refuting or agreeing with the specific type of proposal was given.

To date, experimental work related to sidestream reduction mechanisms has been limited. Recent studies using the Sidestream

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Chamber have shown smaller particle sizes in the aerosol from low sidestream cigarettes. A correlation has been found between particle size and sidestream smoke particulates (TEOM) as measured in the chamber, but smaller aerosol particles cannot account for reduced sidestream visibility as measured by light scattering.

A number of hypotheses have been developed regarding the mechanisms possible for reducing sidestream smoke or influencing subjectives. The hypotheses are framed to provide an understanding of what is really happening to the smoke mass in low sidestream cigarettes and then to answer the question of how. The hypotheses and a brief description of the approaches to be used in addressing each of these are given below:

Hypothesis 1. Some of the sidestream smmoke in low sidestream cigarettes is allocated to mainstream either intact or thermally cracked.

The smoke mass allocation in low sidestream models over a range of porosities, will be measured using radiolabelled tobacco/tracer, neutron radiography, and analytical techniques. Detailed qualitative and quantitative analyses of mainstream and sidestream TPM and gas phase will be obtained and compared with data on standard cigarettes.

Hypothesis 2. Low sidestream papers force sidestream smoke closer to the thermal plume thereby causing some cracking of smoke.

Magnified video images of the smoke plume and Schlieren imaging of the thermal plume, as well as smoke aerosol particle size measurements will be made on low sidestream models containing a variety of fillers and compared with each other as well as with standard cigarettes.

Hypothesis 3. Paper porosity or transient changes in paper permeability at or near the char line is the dominant mechanism of sidestream smoke reduction.

Experiments will be designed to measure changes in paper porosity/permeability with changes in temperature as well through deposition of condensibles.

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Hypothesis 4. Excessive smoke condensation on paper of low sidestream cigarettes is affected by thermal properties of the filler.

Thermal properties, e.g., thermal conductivity and heat capacity of several fillers will be correlated with the quantity of smoke condensate in the paper within a narrow porosity range. Quantity of smoke shall be tracked analytically as well as through neutron radiography.

Hypothesis 5. Sidestream smoke reduction results from thermal (homogeneous vapor phase) and/or catalytic (heterogeneous by tobacco char/ash and filler) cracking of newly formed tars during devolatilization of tobacco.

Fresh tar will also be generated by devolatilization of tobacco and characterized by molecular weight distribution and aerosol formation. The rate and extent of tar cracking as a function of time, temperature, type of catalysts will be determined.

Hypothesis 6. The function of sizing additives in magnesium carbonate low sidestream papers is to provide sintering (cohesion of one particle to another) which leads to ceramic formation.

The thermal behavior and associated physical changes of (a) sizing additives individually, (b) additives plus filler, and (c) additive plus filler plus cellulose, i.e., sized papers, will be determined utilizing high temperature metallurgical hot-stage and reflectance microscope, TGA/DTA/MS, X-ray diffraction, BET surface area, and SEM.

Hypothesis 7. Morphology/chemical composition or surface area of filler (paper) play a role in sidestream reduction.

Examination of in situ changes in morphology, i.e., particle size and shape of filler, occurring in papers in the course of combustion, with correlation to the nature of the filler and sizing agents will be undertaken. Fillers will include both, calcium carbonates and magnesium compounds of different morphologies.

Hypothesis 8. Increased smoke condensate in the cigarette rod is responsible for the negative sensory attributes of cigarettes with magnesite papers.

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Smoke condensate on paper will be extracted and reapplied to cigarettes to evaluate subjective response. Determine whether negative subjectives can be attributed to the particulate or vapor phase of smoke and whether correlations exist among quantity of smoke condensate on the inside of magnesite cigarette papers, porosity, sidestream reduction, and subjectives.

b. Tactics and Timetable

(1) Organize experimental approaches for investigation of proposed mechanisms and identify the resource requirements - fourth quarter, 1991.

(2) Determine whether condensible organics reduce paper porosity in the vicinity of the char-line - first quarter, 1992.

(3) Measure physical properties and chemical composition of sidestream smoke generated by static burn for mined magnesite models and standard cigarettes using the environmental chamber - first quarter, 1992.

(4) Study, by analytical microscopy, the change in morphology and chemical composition (phase changes) of experimental magnesium carbonate/magnesium hydroxide filler materials before and after addition to cigarette paper - first quarter, 1992.

(5) Use imaging techniques, i.e., video, Schlieren, neutron radiography, and IR camera to compare low sidestream and standard models with respect to location of thermal and aerosol plumes, and evidence of vapor condensation within the paper and cigarette rod - mined magnesite models - first quarter, 1992; other models, continuing, as they become available.

(6) Extract and characterize condensibles from the inside of magnesite papers, apply the extract to standard cigarettes, and evaluate subjective responses. Correlate quantity of smoke condensate with sidestream reduction, paper porosity, and subjectives. - second quarter, 1992.

(7) Determine the mechanistic function of sizing additives in magnesium carbonate papers - second quarter, 1992.

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(8) Examine in situ changes in morphology occurring in papers in the course of combustion, with correlation to the nature of the filler and sizing agents - third quarter, 1992.

(9) Determine which properties of filler, e.g., morphology, surface area, heat capacity, thermal conductivity, etc. affect sidestream smoke - third quarter, 1992.

(10) Determine detailed chemical composition of MS and SS gas phase and TPM for low sidestream models and compare with data previously accumulated - third quarter, 1992.

(11) Determine mass allocation of total smoke in low sidestream cigarettes under static and dynamic conditions by analytical and radiochemical techniques - third quarter, 1992.

(12) Model compounds found in smoke as well as freshly generated tar will be submitted to thermal and catalytic cracking to determine the extent of cracking as a function of time, temperature, and type of catalyst to delineate whether sidestream smoke reduction results from homogeneous or heterogeneous catalysis. - fourth quarter, 1992.

(13) Determine the occurrence and possible consequences of transient changes in paper permeability at or near the char line - fourth quarter, 1992.

(14) Review and analysis of data to support or refute hypothesis and validate supported hypotheses - continuing

c. Resource Allocations

Professionals 6
Technicians 1

Total 7

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6. **Strategy Number 6 - Utilize analysis of mainstream smoke, with emphasis on gas phase, to determine smoke chemistry differences between normal and reduced sidestream models in order to design filters which will result in improved subjectives.**

a. Status

Problems with subjectives continue to plague the low sidestream effort. Analyses to date have failed to identify any compound, or classes of compounds, responsible for inferior mainstream subjectives. An empirical approach to the problem is to design filters which will selectively remove certain chemical classes and evaluate these filters on low sidestream cigarettes. Two approaches are being investigated, both based upon the finding that charcoal often improves mainstream subjectives from low sidestream models. The first is to compare models with charcoal to models with CA filters both subjectively and analytically, and to investigate models where the charcoal filter has been chemically modified. A current study is utilizing fifteen cigarette models with eight different filters using both conventional and low sidestream cigarette wrappers. The filter constructions include cellulose acetate, charcoal, and paper filter materials, some with acidic or basic additives. A model with ART filler is also being tested. Mainstream smoke particle size analyses were completed, and no differences were noted in average particle size for the different filter materials. Fractionation of mainstream smoke into acidic, basic, and neutral fractions is being used to obtain relative smoke component deliveries for 200 mainstream smoke compounds. Panel testing has been completed for the models, and the results will be statistically correlated with the smoke component deliveries.

The second approach is to attempt to develop a high surface area material which can be applied to a filter web in solution form. This approach is of particular interest for Virginia Slims Superslims, since a slim charcoal filter would be prohibitively expensive. One promising source of a soluble material which will leave a high surface area residue when the solvent evaporates are the sol-gel derived oxides and carbonates already being investigated for low sidestream papers.

In addition, further studies of smoke chemistry as a function of paper type should be carried out. Detailed compositions of the acidic, basic, and neutral fractions of mainstream smoke condensate for fifteen cigarette models made with conventional and low sidestram wrappers and several different filters were examined by severam statistical approaches. Comparisons of models made with a conventional paper and a low

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sidestream calcium carbonate wrapper show significant shifts in many of the 183 major peaks which were examined. Liking ratings by panelists also show significant differences for the two different wrappers. As of yet, no specific individual components can be isolated as having a determinate effect on the subjective performance of the papers. This analyses will serve as a baseline for comparing low sidestream papers containing magnesium fillers to low sidestream calcium carbonate papers which will be carried out in 1992.

b. Tactics and Timetable

(1) Identify promising sol-gel derived materials for use in fabricating modified filters - March, 1992.

(2) Develop techniques for the application of sol-gels to filter materials - second quarter, 1992.

(3) Test modified filters subjectively and analytically - third quarter, 1992.

(4) Conduct detailed mainstream smoke condensate analyses of low sidestream cigarettes made with a magnesium carbonate paper, a magnesium hydroxide paper, and a calcium carbonate paper - March, 1992.

c. Resource Allocations

Professionals	0.35
Techicians	-
Total	0.35

7. Strategy Number 7 - Develop unique, cigarette compatible catalyst systems which will result in more complete conversion of sidestream gas phase into carbon oxides in order to reduce sidestream odor and irritation by 1995.

a. Status

Although considerable progress has been made directed toward the reduction of sidestream visibility, none of the systems investigated to date has a major obvious effect on sidestream gas phase. Since it is most likely the gas phase which contains those components responsible for sidestream odor and irritation, new techniques must be utilized to address this problem. Work on low sidestream and conventional cigarettes using

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the sidestream chamber will begin to provide us with some information as to the nature of those gas phase components which are responsible for odor and irritation (see below). However, it is not an unreasonable assumption that compounds such as low molecular weight aldehydes, ammonia, and low molecular weight amines are involved. Conceptually, the most effective method to reduce the concentration of such compounds in sidestream smoke would be to incorporate a catalyst of some type in cigarette paper which would result in either oxidizing these compounds to less odorous materials, or ideally to carbon dioxide. This approach will require considerable time and effort.

b. Tactics and Timetable

(1) Invite outside scientists, expert in the field of catalysis, especially as it relates to this strategy, to visit PM R&D and to present technical seminars - June, 1992.

(2) Ask PM R&D personnel expert in this area to present seminars related to catalysis and paper technologies - June, 1992.

(3) Obtain, organize, and evaluate literature and PM information on catalysis in the cigarette area which may be related to paper technologies - June 1992.

(4) Expand R&D staff to include an individual who has proven expertise in catalysis, especially in areas related to this strategy - 1992.

(5) Develop a list of possible target approaches - 1992.

(6) Organize a group of chemists, physicists, and other scientists to provide experimental and theoretical effort - 1992.

(7) Initiate experimental work - 1993.

(8) Evaluate initial results, plan future work, etc. - 1993.

8. Strategy Number 8 - Utilize the sidestream chamber to fully characterize the analytical chemistry of sidestream from appropriate reduced sidestream prototypes in conjunction with subjective evaluation.

a. Status

The sidestream chamber continues to expand in capability. Recent additions include an on-line infrared gas analyzer for determination of

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mainstream carbon monoxide and carbon dioxide in conjunction with normal sidestream collections, and an aerosol dilution device to facilitate determination of sidestream particle size distributions. A study to determine confidence levels in the information generated by the aerosol instruments has begun by conducting repeated measurements on IM13 cigarettes. Interesting data have been generated showing, for the first time, differences in particle size distributions for reduced visibility cigarettes versus conventional controls. Evaluation of the change from double to single wrap for Trim is currently underway by conducting multiple chamber runs to compare prototypes of the two models. Initial planning has begun to modify the chamber to facilitate normal analytical data generation simultaneous with sidestream subjective evaluations. An O.I. Analytical and Hewlett-Packard headspace/gc/ms system has been received and initial installation completed. This multi-component system will be used for trapping and identification of additional sidestream materials from chamber runs.

b. Tactics and Timetables

(1) Complete smokings of Trim single wrap test model versus Trim double wrap control. Analyze data and summarize in memo format - March, 1991.

(2) Become familiar with and devise protocols for collection and analysis of selected chamber smoke components utilizing the recently installed headspace/gc/ms system - second quarter, 1991.

(3) Conduct analysis of selected sidestream smoke components utilizing the headspace/gc/ms system and compare cigarette models with reduced visibility to appropriate controls - second quarter, 1991.

(4) Devise and implement on-line methods for collection of smoke directly into adsorbent tubes for automated analysis utilizing the headspace/gc/ms system - third quarter, 1991.

(5) Investigate the availability of new instrumentation for measurement of smaller sidestream smoke particle sizes than currently possible with in-house analyzers. Submit appropriate requests for purchase - second quarter, 1991.

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(6) Examine additional aerosol instrumentation for potential chamber incorporation - third quarter, 1991.

(7) Construct an improved sidestream smoke dilution device for determination of sidestream smoke particle size distributions - September, 1991.

(8) Study the behavior of smoke aerosols over extended time periods and construct a data base of aerosol information on IM13 controls and selected cigarette models - continuing.

(9) Initiate a new program to monitor sidestream analyticals while simultaneously conducting subjective evaluations in February, 1991. This new program includes:

(a) Evaluate various means for conducting subjective evaluations on sidestream smoke external to the sidestream chamber on cigarettes smoked within the chamber - March, 1991.

(b) Modify the sidestream chamber door to facilitate sidestream subjective studies - March, 1991.

(c) Determine the appropriate number of cigarettes to yield valid subjective data as well as appropriate analytical data - April, 1991.

(d) Utilize the seven models defined for this study to determine sidestream subjectives simultaneous with collection of sidestream and selected mainstream data - second quarter, 1991.

(e) Conduct normal 30 cigarette (5 cigarette aerosol) runs to generate sidestream and selected mainstream data - second quarter, 1991.

(10) Determine experimental conditions necessary for the collection and quantitation of acrolein from cigarettes smoked within the sidestream chamber. Utilize this procedure to monitor selected cigarette models for sidestream acrolein - third quarter, 1991.

(11) Determine experimental conditions necessary for the puff-by-puff quantitation of nicotine generated in sidestream smoke. Utilize this procedure to determine puff-by-puff nicotine from selected cigarette models - third quarter, 1991.

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(12) Investigate the feasibility of utilizing an on-line total sulfur analyzer in the sidestream chamber. Install and operate if shown to be effective - fourth quarter, 1991.

c. Resource Allocations

Professionals	3.20
Technicians	0.80
Total	4.00

9. Strategy Number 9 - Elucidate the chemistry of the pyrolysis/combustion of cigarette paper as a function of additives, temperature, etc.

a. Status

The results of a Box-Behnken study conducted with the Solar Energy Research Institute (SERI) quantified the effect of potassium ion concentration, pH, and pyrolysis temperature on cellulose and paper pyrolysis product distribution. Differences in the product mix resulting from different additives to papers are believed to affect subjectives. The work was done using molecular beam mass spectrometry to evaluate the pyrolysis and combustion product mix for flax samples and high basis weight paper samples to which three levels of mono potassium phosphate were added at three pH levels (3, 4.4, and 9). The pH 9 level is equivalent to dipotassium phosphate. Results showed that three main product slates were a direct function of pH, potassium ion concentration, and temperature. These three principal classes of compounds are anhydrosugars, carbonyl compounds, and furan-type compounds. The data generated to date by this work are considered by patent counsel to be sufficient to support our patent claims for PM 1393. This patent is for the high basis weight paper which will be used for the single wrap Virginia Slims Superslims. Additional data also indicate that there is an interaction between the phosphate and the calcium carbonate which affects the products formed when the paper is burned or pyrolyzed. The effect depends on the amount of oxygen present.

b. Tactics and Timetable

The following outline gives a brief description of the work to be done at SERI in 1991-1992. Samples will be provided by Philip Morris. Pyrolysis-mass spectral analyses and data reduction by multivariate analyses will be performed at SERI.

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(1) Pyrolysis and combustion of selected paper samples using temperatures ranging from 480-650°C - second quarter, 1991.

(2) Pyrolysis and combustion of phosphate treated papers at different oxygen levels - second quarter, 1992.

(3) Perform collision induced decomposition on selected nominal m/z values of interest under conditions of particular interest as determined jointly by PM and SERI researchers - third quarter, 1992.

(4) Quantitate selected compounds from key experiments - third quarter, 1992.

(5) Evaluate the effect of divalent metal ions on the pyrolysis and combustion of selected flax and paper samples - third quarter, 1992.

(6) Analyze model compound in "cracking" study molecular beam mass spectrometry - fourth quarter, 1992.

(7) Carry out detailed studies of the pyrolysis of ^{13}C-labelled cellulose in order to elucidate the mechanism of its pyrolysis under conditions relevant to cigarette paper pyrolysis - first quarter, 1992.

c. Resource Allocations

Professionals	0.50
Technicians	0.20
Total	0.70

D. Resource Allocations for Reduced Sidestream

Professionals	11.55
Technicians	4.65
Total	16.20

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III. Papers to Control Ash Flaking and Puff Count

A. Objective - To design a cigarette paper which will control ash flaking on ultra low delivery cigarettes and give low puff counts without the need to apply high citrate levels. Completed March 1991.

B. Introduction and Status

The design of low delivery cigarettes, such as BOLD and Marlboro Ultra Lights, has previously required the use of a high porosity paper with high levels of citrate (about 2.5%). It has been established that the use of high citrate levels results in increased ash flaking while the cigarettes are being smoked. In addition, even with a paper with a Coresta porosity of 46, and 2.5% citrate, the BOLD prototypes are still about one-half puff more than target. Work on the low sidestream program had indicated that increasing basis weight would decrease puff count, and possibly decrease ash flaking as well. Further work demonstrated that going from a basis weight of 25 to 30 g/m^2 on Marlboro Ultra Light enabled puff counts and tar delivery to be matched with the control with 1% citrate instead of 2.5% citrate. The higher basis weight model appears to have no ash flaking problem, and preliminary subjective screening has been promising to date.

Both calcium carbonate level and the ratio of sodium to potassium citrate have also been evaluated as to their effect on puff count. Increasing calcium carbonate reduces puff count. This finding is of considerable importance to the BOLD program, since our suppliers routinely use low calcium carbonate levels in high porosity papers. It was demonstrated that a 25 g/m^2 basis weight paper with 1.7% citrate and 36% calcium carbonate at 46 Coresta will meet the target puff count in a BOLD configuration. Increasing calcium carbonate levels also will decrease ash flaking. This point is still being studied. Sodium to potassium citrate ratio, on the other hand, had no measurable effect on puff count.

Lastly, the effect of Multifex chalk was investigated. Although there was a definite decrease in puff count when equal levels of Albacar chalk were compared to Multifex chalk, all evaluations to date on BOLD indicate that the Albacar models are subjectively preferred.

There were two major strategies which were being pursued to accomplish the objective for this part of the program. These were:

1. Evaluate papers with varying basis weights, calcium carbonate levels, and citrate levels in order to relate these parameters to puff count, and designate optimum papers for BOLD and Marlboro Ultra Lights.

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2. Carry out studies relating the effect of basis weight, calcium carbonate levels and citrate levels to ash flaking in order to design papers for ultra low delivery cigarettes with reduced ash flaking.

Each of these strategies will be discussed in detail below.

C. Strategies and Tactics

1. Strategy Number 1 - Evaluate papers with varying basis weights, calcium carbonate levels, and citrate levels in order to relate these parameters to puff count, and designate optimum papers for BOLD and Marlboro Ultra Lights.

a. Status

Initial BOLD prototypes made had not achieved the desired puff count using conventional design methods. Information obtained regarding cigarette papers from the reduced sidestream program has provided three additional approaches to reducing puff count; namely, increasing the basis weight of the papers, increasing the calcium carbonate content of the papers, and increasing the potassium to sodium ratio for the citrate sizing. Moreover, there is also evidence to indicate that replacing Albacar with Multifex chalk results in a decreased puff count. Two years ago, sufficient data existed to qualitatively substantiate these conclusions, but we had no in-house data to be able to establish the quantitative relationship of any of the above parameters to puff count, particularly in dealing with conventional cigarette papers. An early study was run using papers with basis weights of 25, 30 and 35 g/m^2 at 35 Coresta porosity sized with three levels of citrate (0, 1, and 2.5% with a 2.8:1 sodium to potassium ratio). These papers were used to make cigarettes to Marlboro Ultra Lights specifications except for the papers. This study established the quantitative relationship of basis weight with puff count, and showed that a cigarette with a 30 g/m^2 basis weight paper with 1% citrate was essentially identically matched with respect to FTC tar delivery and puff count to a model with 25 g/m^2 paper sized with 2.5% citrate.

Two additional studies were conducted. The first utilized a series of 22 papers at three different basis weights (25, 30 and 35 g/m^2), with three different levels of both Albacar and Multifex calcium carbonate (25, 30, and 36%), and two different levels of citrate (2.5 and 1.7% with a 2.8:1 sodium to potassium ratio). These papers were used to make cigarettes to BOLD specifications, and puff count and tar data were obtained on weight and ventilation selected cigarettes. The conclusions

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from this study showed that increasing calcium carbonate decreases puff count, increasing basis weight decreases puff count, and substituting Multifex for Albacar chalk also decreases puff count. Subjective screening to date indicates that there does not appear to be a subjective penalty incurred by increasing calcium carbonate level. Two patent applications were filed in April 1991 related to the specially designed papers which resulted from these studies.

PM 1570 covered the use of high chalk papers for use in optimizing the puff count of low delivery cigarettes. PM 1596 covered the use of fine particle size chalk in cigarette paper to accelerate the burn rate in high or low delivery cigarettes.

The paper which was successfully developed for Project BOLD was a 28 g/m^2 paper with 35% calcium carbonate, 1.7% sodium/potassium citrate, at 46 Coresta porosity. A follow-up study of the effect of porosity from 37 to 50 Coresta on BOLD models showed little effect on puff count over this range. This is apparently in the flat region of the puff count - porosity curve.

This paper has already been introduced commercially on two cigarette brands, Cambridge and Bristol Lowest. It will also be used on the 1mg product which will be introduced in Europe October 1, PM Lights Extra.

b. Tactics and Timetables

(1) Obtain factory prepared Marlboro Ultra Lights Models - October 1991.

(2) Determine feasibility of replacing 46 Coresta 1.7 and 2.6% citrate papers on other models - November 1991.

c. Resource Allocations

Professionals	0.50
Technicians	0.05
Total	0.55

2. Strategy Number 2 - Carry out studies relating the effect of basis weight, calcium carbonate levels and citrate levels to ash flaking in order to design papers for ultra low delivery cigarettes with reduced ash flaking.

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a. Status

Ultra low delivery cigarettes with high ET content tend to flake more than normal cigarettes. There are two reasons for this. The first is a consequence of the blend itself. High ET blends form a less dense ash on smoking which results in a total ash - tobacco and paper - of lower integrity than from a cigarette containing a normal blend. The second is that current PM ultra low delivery cigarettes contain high levels of citrate which contributes to the problem. Possible approaches to eliminating this problem through redesigning the cigarette paper were to: 1) increase the basis weight of the paper; and 2) utilize a higher surface area chalk. Encouraging results have been obtained with both of these approaches. The second approach may be problematical. Substituting Multifex chalk for Albacar chalk at equal porosities and basis weights results in a paper with lower tensile strength. Nevertheless, further work may be appropriate since this approach gave the best ash characteristics, based on a dynamic ash evaluation test. This test can provide reproducible and quantitive evaluations for ash cohesiveness and was developed for use on the five port smoker. Ratings obtained in this manner in blind testing were reproducible and showed that both the fine particle size chalk and increased levels of the standard Albacar chalk give improved ash cohesiveness. Increased basis weight also improves the ash. These findings were used to file a patent for papers and cigarettes for improved ash characteristics, PM1518. The optimized paper (the same as for BOLD) will be evaluated on other cigarette brands with ash flaking problems.

b. Tactics and Timetables

(1) Evaluate factory made MFUL cigarettes made with 28 g/m^2 papers for ash flaking - October 1991.

(2) Apply technology to Merit Ultra Lights - Fourth quarter, 1991.

c. Resource Allocations

Professionals	0.40
Technicians	0.10
Total	0.50

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D. Resource Allocations for Papers for Control of Puff Count and Ash Flaking

Professionals	0.90
Technicians	0.15
Total	1.05

IV. Project Tomorrow

A. Objective - To develop procedures for the application of transverse bands to cigarette paper in order to control burn rate by January, 1993.

B. Introduction and Status

It was shown some time ago that a Kimberly-Clark patented paper made by affixing small bands of a dense paper to normal cigarette paper resulted in cigarettes which would self-extinguish when the char line reached the band. There are many problems associated with this concept, however, particularly problems in making the paper at high speed, and the effect of such paper on current cigarette making machines. As a consequence, several approaches have been looked at to apply some type of transverse bands to cigarette paper. One such approach is the "daubing dandy." The original daubing dandy concept consisted of a modified dandy roll designed to apply intermittent layers or bands of cellulose across the wet base web on a paper machine. The concept was reduced to practice at the University of Maine, and papers were prepared there using both hardwood pulp, Cellulon, and Buckeye "expanded fiber." Cigarettes were produced with the hardwood banded paper which exhibited the desired burn rate control. Because of the mechanical complexities involved in wet-end modification of a paper machine, support was obtained from PM Engineering to scale up the daubing dandy concept. Most recently, Beloit Corporation has been contacted to design an approach suitable for achieving this objective. A patent application, PM 1429, was filed in November, 1990.

A second approach is the application of a cellulosic material to the paper off-line through the use of a rotogravure-type printing technique. AVICEL, a microcrystalline cellulose, was successfully applied using CMC as a binder with a modified rotogravure roll. Two other materials, Cellulon and Buckeye's "expanded fiber," have also been investigated. Due to the unique properties of these materials, they have the ability to bind to paper without an adhesive. Because of their fibrous character, however, they require modification in order to apply a rotogravure-type technique. Extrusion-type, spray or ink jet techniques have been found to be suitable for processing these materials, and the appropriate equipment has been evaluated. Patent application PM 1479 was filed in September 1991. Commercialization efforts with Kimberly-Clark are under way.

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The last approach investigated involved the application of calendered bands to the paper before it is completely dry. Patents have previously been issued claiming calendered bands on dry paper. However, in order to achieve a measurable effect on burn rate, the paper must be calendered at least four times. Since wet paper is far more compressible than dry paper, that approach was studied for feasibility but has been abandoned.

As is obvious from the above discussion, there are two major strategies still being pursued by the Paper Technology Program for Project Tomorrow. These are:

1. Design and construct modifications to a paper making machine which will allow the application of cellulosic bands to paper at or near the wet end.

2. Explore the application of bands of cellulose to cigarette paper using either rotogravure or extrusion-type techniques.

Each of these strategies will be discussed in detail below.

C. Strategies and Tactics

1. Strategy Number 1 - Design and construct modifications to a paper making machine which will allow the application of cellulosic bands to paper at or near the wet end.

a. Status

The initial evaluation of a rotogravure type band application positioned above the couch roll on Beloit's pilot paper machine was partially successfully. Band contrast was acceptable, the bands remained intact through the press section, and the device did not interfere with the operation of the paper machine. Unfortunately the level of application was low and uniformity within the banded region was unacceptable.

Two major modifications were made to the rotogravure system. The banded section on the rotogravure roll has been ground with noncontinuous grooves which should restrict the blade from dipping into the grooves. This should increase application level. The addition of 1% CMC (based on Cellulon) to the slurry (a 1% mix of homogenized Cellulon) improves flow and agglomeration characteristics. This modification should improve band uniformity. In addition a florescence dye has been developed for use as a tracer to determine the level of application.

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Exploratory work at Bryce-Jewett under the supervision of PM Engineering resulted in a development of a slurry application device (moving orifice) that can apply bands by spraying slurry (1% homogenized Cellulon). The moving orifice has been successfully operated at production speed by spraying on a moving belt. Both the rotogravure applicator and the moving orifice will be evaluated at Beloit in October 1991.

b. Tactics and Timetables

(1) Modify the rotogravure coater as required to produce acceptable banded paper - December, 1992.

(2) Evaluate the moving orifice application device at Beloit - December, 1991.

(3) Assist PM Engineering in the evaluation of these units - December, 1991.

c. Resource Allocations

Professionals	0.75
Technicians	0.75
Total	1.50

2. Strategy Number 2 - Explore the application of bands of cellulose to cigarette paper using either rotogravure or extrusion-type techniques.

a. Status

Colloidal cellulose - In this concept bands of cellulosic material are applied transversely to the dry paper by a rotogravure-type printing technique. The cellulosic material used is a form of microcrystalline cellulose of very fine particle size (0.2 μ). This material, AVICEL CL-611, is co-processed with CMC, which serves to stabilize the colloidal suspension. A modified gravure roll was designed in conjunction with Filter Development. This roll demonstrated the ability to transfer bands of the colloid to the substrate in varying levels. Up to 13% concentration levels were achieved in the bands. On 137-1 paper, about 3.5% addition level in the bands achieves the desired objective. A patent application, PM 1479, has been filed. A confidentiality agreement with Kimberly-Clark has been obtained, and further work with the material will be done in conjunction with KC.

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In related experiments, cigarettes which already show some reduced burn rate were hand-painted with different levels of the colloidal material. Using propyl paraben as a tracer, it was found that application levels of 3, 1.5, and 0.4% of the colloid were effective at obtaining further burn rate control. Electron microscopy work showed that the fibrous materials form a dense mat on the surface of the paper web, providing a region in which burn rate is inhibited.

Cellulon - As was pointed out above, both Cellulon and Buckeye's "expanded fiber" have the ability to bind to paper without an adhesive. Further development work is planned with Cellulon, once a cleaner material has been developed. Work with "expanded fiber" is on hold.

b. Tactics and Timetable

Colloidal Cellulose (Avicel)

(1) Obtain coated papers at two different porosities with different levels of application, and different band width and spacing of bands - Fourth Quarter 1991.

(2) Prepare cigarettes with these papers with conventional cigarette configurations - January 1992.

(3) Evaluate cigarettes for zone-specific burn rate modification and working with Product Development USA, optimize cigarettes - Second Quarter 1992.

Cellulon

(1) Continue work with "Ryder-roll" - Fourth Quarter 1991.

(2) Obtain PM cleaned Cellulon and other samples for biological studies - Fourth Quarter 1991.

(3) Negotiate exclusivity on uses of cleaned Cellulon for Philip Morris - Fourth Quarter 1991.

(4) Obtain machine-made papers with appropriate levels of cleaned Cellulon in bands - March 1992.

(5) Prepare cigarettes from machine coated material - April 1992.

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(6) Evaluate cigarettes for burn rate modification and determine if more work should be done with this approach - June, 1992.

(7) If accepable, proceed toward commercialization.

c. Resource Allocations

Professionals	0.80
Technicians	0.40
Total	1.20

V. Cigarette Paper Specifications

A. Objective - To determine those cigarette paper parameters which effect cigarette specifications and manufacturing processes and set meaningful specifications and tolerances for cigarette papers.

B. Introduction and Status

At present cigarette paper specifications can be divided into three separate types: 1) parameters which affect cigarette performance, e.g., paper porosity; 2) properties which affect cigarette making, e.g., tensile strength; and 3) properties which affect cigarette appearance, e.g., paper opacity. Recent studies have shown that there are at least four paper properties which affect cigarette performance; namely, porosity, level of citrate, level of calcium carbonate, and basis weight. Although we have specifications for all of these, only two of them - porosity and basis weight - are routinely monitored. Calcium carbonate was not defined as a critical parameter. Moreover, studies had not been carried out to establish appropriate tolerances to ensure that cigarette deliveries and puff counts are within specifications. In the case of calcium carbonate level, the importance not was not previously known. The studies discussed below will provide information for establishing meaningful paper specifications.

The goal of the experiment was to determine the effects of physical paper properties on the performance of cigarettes, particularly in terms of tar delivery and puff count. The properties of interest were basis weight, chalk content, porosity, and citrate level. If we had evaluated three levels of each parameter, the total number of combinations would have been unmanageably large. Since it was known that interactive effects could be accounted for through experimental design, John Tindall's help was enlisted in recommending a set of combinations to give valid results without having to use all the possibilities in making cigarette models.

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The cost of making all papers for the design would have been prohibitive. Consequently, an inventory of papers that were readily available from Kimberly-Clark served as the starting point around which the experiment was designed.

The basis weight ranged from 25 to 35 grams per square meter; the chalk content ranged from 25 to 37%; the porosity ranged from 13 to 46 CORESTA; and the citrate level ranged from 0.6% to 2.6%. The effect of using Multifex chalk was also investigated. Of the 33 papers, Kimberly Clark had base papers available for 24, and only had coating with the appropriate level of citrate was required. Kimberly-Clark made five mill runs and coated them to give the remaining nine papers.

Samples of each paper were submitted to ARD for Ca content, from which chalk level was calculated, and to CI for citrate level. The basis weight and porosity were measured for each paper by Cigarette Technology personnel. After cigarettes were made with the papers, samples were resubmitted for all the physical testing, so we would be certain of the attributes of the paper on the cigarettes. Cigarettes were then made in the R&D Semiworks from each paper to Marlboro KS construction. The somewhat surprising result of this study was that the chalk level affects tar delivery as much as the porosity of the paper.

At the lowest chalk level allowed by the spec, 24%, the program predicts the tar delivery will be 16.5 mg, within the range of the one-week average. At the highest level, 37%, the predicted tar delivery is 15.3 mg, below the lower tar limit for one-week or running eight-week averages.

The two strategies which will be pursued to continue these evaluations are:

1. Evaluate the effects of paper properties on cigarette performance attributes (puff count, tar, static burn time, etc.) in order to determine whether tolerances on paper specifications are appropriate for Marlboro or other full flavor cigarettes, including determination of paper uniformity requirements for the product.

2. Evaluate the effects of paper properties on cigarette performance attributes (puff count, tar, static burn time, etc.) in order to determine whether tolerances on paper specifications are appropriate for low delivery cigarettes.

Each of these strategies will be discussed in detail below.

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C. Strategies and Tactics

1. Strategy Number 1 - Evaluate the effects of paper properties on cigarette performance attributes (puff count, tar, static burn time, etc.) in order to determine whether tolerances on paper specifications are appropriate.

a. Tactics and Timetable

(1) Present results of study to an interdepartmental group for discussion. September, 1991.

(2) Test the model, using different or production papers. fourth quarter 1991.

(3) Provide information to B. Carter for Fast Flow program - September, 1991.

(4) Obtain pallet uniformity requirements for Marlboro wrapper. October, 1991.

(5) Based on recommendations, propose changes required of vendors. November, 1991.

(6) Prepare and publish report - first quarter, 1992.

(7) Negotiate appropriate changes, if any, with vendors. second quarter 1992.

b. Resource Allocations

Professionals	0.75
Technicians	.10
Total	0.85

2. Strategy Number 2 - Perform the same evaluations for low delivery cigarettes using Marlboro Ultralights as the cigarette prototype.

a. Tactics and Timetable

(1) Submit cigarette requests - November, 1991.

(2) Obtain CI data - December, 1991.

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(3) Evaluate data statistically. January, 1992.

D. Resource Allocations for Specifications Project

Resource Allocations

Professionals	0.75
Technicians	.25
Total	1.00

VI. Improved Tipping Papers

A. Objectives - Develop improved tipping papers to reduce potential customer complaints by December, 1991.

B. Introduction and Status

Current tipping papers are still subject to at least two quality problems on an occasional basis; namely, filter flare-up and lip release. Initial work with cork-on-white tipping has established that using defined levels of low silicate inks appears to eliminate the filter flare-up problem. Work is ongoing to qualify such tipping papers. Some success has been achieved improving lip release properties of white tipping. This has been accomplished by double coating the tipping paper with nitrocellulose. However, the improvement is perhaps only marginal. If substantial improvements cannot be made with current "hold out" agents, research work on new materials to take the place of nitrocellulose will have to be initiated.

The two strategies being pursued to accomplish the objective are:

1 Modify cork-on-white tipping to eliminate filter flare-up through the use of defined levels of low silicate inks by June, 1991.

2. Modify white tipping papers to improve lip release properties by December, 1991.

Each of these strategies will be discussed in detail below.

C. Strategies and Tactics

1. Strategy Number 1 - Modify Cork-on-white tipping to eliminate filter flare-up through the use of defined levels of low silicate inks.

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a. Status

Based on a very low complaint rate from customers, filter flare-up no longer appears to be a customer problem with cork-on-white tipped products. However, occasional high filter flare-up rates have occurred for cork-on-white tipped products during testing on the smoking machine. The use of modified cork inks containing low levels of silicates, especially at reduced ink weights (3.0 vs. 4.0-4.5 g/m^2), has reduced flare-up during machine testing. Both the Merit-type and the Marlboro-type color standards have been met with the low silicate inks at 3.0 g/m^2 . Subjective and machining acceptability remain to be demonstrated.

b. Tactics and Timetable

(1) Produce Bristol and Merit models in the factory for internal panel testing - April, 1991.

(2) Demonstrate subjective parity of low silicates/low ink weight tippings with current Merit and Bristol tippings - April, 1991.

(3) Conduct round robin ink weight testing with QA Labs to establish a gravimetric ink weight test method for incoming materials inspection - April, 1991.

(4) Conduct initial (one pallet) factory machinability trials of tippings with low silicate inks from Colonial Heights, Hermetite, and Golden Belt - third quarter, 1991.

c. Resource Allocations

Professionals	0.10
Technicians	-
Total	0.10

2. Modify white tipping papers to improve lip release properties by December, 1991.

a. Status

Lip release properties of white tippings are not as good as those of cork tippings. White tippings typically have about 0.5 g/m^2 of nitrocellulose coating to prevent the tipping from sticking to the lips; cork

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

tippings contain from 1.5 to as much as 5.0 g/m² of cork ink with nitrocellulose included in the formulation. Two approaches are being investigated to improve the lip release characteristics of white tipping: (1) improve the nitrocellulose coating process and (2) improve the basesheet to enhance the barrier properties of the coating. Ecusta used a two-pass coating process to apply 0.9 g/m² of nitrocellulose to the tipping; a slight improvement in lip release rating has been obtained with this tipping. No machinability testing has been conducted to date for the increased coating level. An increased sizing level in Kimberly-Clark's GSR-236M3 tipping has also given a slight improvement in lip release ratings.

b. Tactics and Timetable

(1) Produce factory models of Marlboro Lights 100 with two-pass coated tipping for taste and odor approval - March, 1991.

(2) Determine factory machining performance of Ecusta Marlboro Lights tipping converted with the two-pass coating process - April, 1991.

(3) Evaluate the lip release performance of GSR-236M3 tipping coated with nitrocellulose in a two-pass coating process by Hermetite - April, 1991.

(4) Recommend basesheet and coating combination to give improved lip release properties for white tippings - May, 1991.

c. Resource Allocations

Professionals	0.15
Technicians	-
Total	0.15

D. Resource Allocations for Tipping Paper Project

Professionals	0.25
Technicians	-
Total	0.25

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

VII. Wood Pulp Papers

A. Objective - Qualify one or more alternate supplier of wood pulp cigarette paper at each of four porosity grades

B. Strategy - Qualify one or more alternate suppliers of wood pulp cigarette paper at each of four porosity grades.

1. Status

Initial applications of wood pulp cigarette wrappers to generic and price/value brands involve four porosity grades from Kimberly-Clark ranging from 22 to 46 Coresta units in permeability. Ecusta and Wattens wood pulp papers at each of the four porosity grades were evaluated analytically and subjectively. Analytical smoking results showed interchangeability among the three suppliers for each grade. Basic FF KS models made in the factory with 27 Coresta papers from both Ecusta and Wattens were judged to be subjectively acceptable alternatives to the KC control cigarettes by the Richmond Panel. Due to relatively low current usage of wood pulp papers, only the Ecusta material was selected for factory qualification testing. Manufacturing Services is completing the final (truckload) qualification step for Ecusta 27 Coresta paper.

Sample bobbins of wood pulp papers were requested from Papeteries de Mauduit, our third supplier of flax papers, at each of the four porosity ratings. These papers are currently being tested relative to the KC grades for physical properties and analytical smoking performance.

Some difficulties occurred with sideseam adhesion during the initial manufacture of cigarettes at 8000 per minute at Cabarrus using 46 Coresta KC wood pulp paper. Test adhesives from two suppliers were evaluated at Cabarrus with the 46 Coresta paper and gave good seaming performance during a three day trial. Monitoring of seam adhesion quality is continuing.

2. Tactics and Timetable

a. Demonstrate the interchangeability of PDM wood pulp cigarette papers with KC and Ecusta papers to meet analytical smoking requirements (October, 1991).

b. Conduct panel testing to demonstrate subjective acceptability of PDM wood pulp papers (November, 1991).

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c. In conjunction with Manufacturing Services, monitor seaming performance with 46 Coresta wood pulp paper (4th Qtr., 1991).

VIII. Products for Aroma Modification of Sidestream

A. Objective - To develop a modified cellulosic incorporating a flavorant or flavorant system covalently bound to the cellulose so that when the modified cellulose is incorporated into cigarette paper, preferably at the wet end of the paper machine, the flavorant will be thermally released when the cigarette is smoked.

B. Introduction and Status

Covalent bonding of a flavorant molecule to either cellulose or starch is a difficult objective since both polysaccharides are insoluble in most solvents. Therefore, reactions must be carried out in a heterogenous system. However, the hydroxyl groups of the polysaccharides provide a point of reaction that can be exploited. The two types of linkages initially under investigation were carbonates and acetals.

Linking a flavorant to a polysaccharide through a carbonate was investigated. Flavor compounds, such as Aromatek 245, can be activated by a 2,3-cyclic carbonate. Ring opening of the cyclic carbonate (1) by the hydroxyl groups of cellulose or starch will provide a carbonate linkage between Aromatek 245 and the polysaccharide. Other target molecules are 1,2:3,4-di-O-methylidene α-D-galactopyranose derivatives of α-hexylcinnamaldehyde (2) and vanillin (3). A chloroformate can be formed at the C-6 position which can then be reacted with starch or cellulose.

Exploration of the linkage of a flavorant to a polysaccharide through a carbonate was conducted using model compounds. Methyl 4,6-*O*-benzylidene-α-D-glucopyranoside 2,3-cyclic carbonate was prepared. Ring opening of the cyclic carobnate group by n-butanol produced methyl 4,6-*O*-benzylidene-2-*O*-butyl-α-D-glucopyranoside and its 3-*O*-iosmer in about equal amount. Pyrolysis of either of the two isomers gave methyl 4,6-*O*-benzylidene-α-D-glucopyranoside, indicating the carbonate linkage is thermally more labile than the acetal linkage of the desired flavor. The direct carbonate linkage of a flavor, rather than the trans-2,3-cylclic carbonate of a glucose derivative of the flavor, remains to be investigated. To this end, a confidentiality agreement was signed between Philip Morris and Aqualon for a joint development project on the preparation of cellulosic bound flavors.

C. Tactics and Timetable

(1) Assemble a technical package for potential syntheses of covalently linked vanillin or ethylvanillin to cellulose or cellulose derivatives (fourth quarter, 1991).

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(2) Consult with Aqualon engineers to discuss synthetic strategies (fourth quarter, 1991).

(3) Obtain appropriate bulk supplies of starting materials, such as vanillin chloroformate (first quarter, 1992).

(4) Monitor progress of Aqualon work and obtain analyses of thermal stability and degree of flavor release of modified cellulosics (second quarter, 1992 and continuing).

(5) Investigate handsheet production incorporating modified cellulosics and evaluate flavor release (first quarter, 1993).

D. Resource Allocations

Professionals	1.35
Technicians	0.35
Total	1.70

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Resource Allocation Summary

A. Reduced Sidestream

Professionals	11.55
Technicians	4.65
Total	16.20

B. Control of Puff Count and Ash Flaking

Professionals	0.80
Technicians	0.10
Total	0.90

C. Project Tomorrow

Professionals	1.30
Technicians	0.75
Total	2.05

D. Filter Web Development Support

Professionals	0.80
Technicians	0.70
Total	1.50

E. Cigarette Paper Specifications

Professionals	0.65
Technicians	-
Total	0.65

F. Improved Tipping Papers

Professionals	0.25
Technicians	-
Total	0.25

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G. Aroma Modification of Sidestream

Professionals	1.35
Technicians	0.35
Total	1.70

Totals For Paper Technology

Professionals	16.70
Technicians	6.55
Total	23.25

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NEW EXPANDED TOBACCO PROGRAM

1991 OPERATIONAL PLANS

2021530035

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

OBJECTIVE

The objectives of the New Expanded Tobacco program are to: 1) develop an expanded tobacco material having more "tobacco-like" subjectives, 2) reduce degradation to allow for improved product quality and better yield, and 3) reduce CO_2 emissions as compared to DIET.

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

STRATEGIES

I. Define process modifications that will improve product thermal treatment uniformity and reduce degradation which can be included in the planned DIET installations.

II. Develop a batch gas impregnation process which will result in improved product subjectives and physical characteristics relative to the present DIET process.

III. Develop a continuous gas impregnation process which will result in improved product subjectives and physical characteristics relative to the present DIET process.

IV. Develop new expansion and reordering schemes which will produce expanded tobacco with improved subjectives, better process control, and greater processing design flexibility.

V. Define a process to chemically stiffen expanded tobacco which will reduce thermal treatment and the associated subjective degradation while maintaining cigarette filling power equivalent to the current process.

VI. Evaluate the feasibility of converting existing DIET plants to the NET processes.

VII. Develop and evaluate processing alternatives to the DIET process to produce partially expanded tobacco for inclusion in cigarette blends, which will reduce cigarette density to 0.18 g/cc while maintaining acceptable physical and subjective characteristics.

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

I. Strategy

Define process modifications that will improve product thermal treatment uniformity and reduce degradation which can be included in planned DIET installations.

Tactics:		Completion Date
A.	Assure plug flow, short residence time at the tower infeed.	12/91
B.	Provide uniform gas-tobacco distribution in the tower.	12/91
C.	Eliminate separator recycle and provide plug flow discharge.	12/91

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II. Strategy

Develop a batch gas impregnation process which will result in improved product subjectives and physical characteristics relative to the present DIET process.

Tactics:		Completion Date
A.	Support commercial design of the current batch gaseous CO_2 impregnation process.	on-going
B.	Define process parameters for a higher pressure batch gaseous CO_2 impregnation process.	7/91

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III. Strategy

Develop a continuous gas impregnation process which will result in improved product subjectives and physical characteristics relative to the present DIET process.

Tactics:		Completion Date
A.	Design and develop a continuous impregnation pilot process utilizing proven equipment and technology.	12/91
B.	Design and develop a continuous impregnation process utilizing a linear-pocket process concept.	12/91
C.	Design and develop a high pressure rotary valve for feeding and discharging tobacco from an impregnator.	12/91

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IV. Strategy

Develop new expansion and reordering schemes which will produce expanded tobacco with improved subjectives, better process control, and greater processing design flexibility.

Tactics:		Completion Date
A.	Design and develop a system which decouples the puffing, drying, and setting steps associated with tobacco expansion.	12/91
B.	Evaluate humid air and conveyor reordering systems compared to cylinder reordering and specify a reordering process to minimize breakage and maximize CV.	9/91
C.	Implement the defined processing steps/parameters into the NET pilot system for evaluation.	10/91
D.	Optimize and evaluate the processing schemes for production of expanded tobacco having the desired product quality and subjectives.	12/91

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V. Strategy:

Define a process to chemically stiffen expanded tobacco which will reduce thermal treatment and the associated subjective degradation while maintaining cigarette filling power equivalent to the current process.

Tactics:		Completion Date
A.	Identify the critical chemical parameters which determine the amount of stiffening.	Ongoing
B.	Evaluate the effect of processing steps on acetic acid content of expanded tobacco stiffened with calcium acetate.	10/91
C.	Identify and evaluate alternative additive systems which may provide a subjective advantage.	11/91
D.	Define the relationships between add on level, bulk time, filling power, and subjective results for the stiffening additives.	11/91
E.	Determine the application method for adding the stiffening agent to expanded tobacco feedstock.	12/91
F.	Conduct product tests to evaluate the physical and subjective qualities of chemically stiffened expanded tobacco.	12/91
G.	Determine the repeatability of the selected process.	12/91
H.	Investigate the aging characteristics of chemically stiffened product.	12/91

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VI. Strategy:

Evaluate the feasibility of converting existing DIET plants to NET processes.

Tactics:		Completion Date
A.	Develop a batch gaseous CO_2 impregnation process that is compatible with existing DIET equipment.	1/93
B.	Define the modifications required to retrofit existing DIET plants with gaseous CO_2 impregnation.	4/93
C.	Identify NET processing schemes that are feasible for inclusion in existing DIET plants.	6/93
D.	Define the DIET plant revisions and pilot the system for process and product evaluations.	8/93

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VII. Strategy:

Develop a process to produce partially expanded tobacco for inclusion in cigarette blends, which will reduce cigarette density to 0.18 g/cc while maintaining acceptable physical and subjective characteristics.

Tactics		Completion Date
A.	Identify and test potential processing schemes.	6/92
B.	Construct a pilot development facility.	9/92
C.	Determine the relationship between processing conditions and subjective/physical properties for each tobacco type (bright, burley oriental).	12/92
D.	Compare the effect of blend expansion in various combinations with the expansion of individual blend components on subjective/ physical properties.	3/93
E.	Determine the contribution of DIET and ES components to subjective/physical properties both as standard expanded products and as included in partial expansion.	6/93
F.	Analyze blend similarities and production requirements for all brands.	9/93
G.	Select processing scheme and conduct detailed physical, chemical, subjective, and economic evaluations.	12/93

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NEW EXPANDED TOBACCO PROGRAM

ESTIMATED RESOURCE REQUIREMENTS

I. ALLOCATED PERSONNEL*

	CURRENT	12-31-91
Analytical Research	3.00	3.00
Computer Applications	0.20	0.20
Cigarette Development	0.30	0.50
Cigarette Testing	3.50	3.50
Development Engineering	3.50	3.50
Flavor Development	0.85	0.60
Product Evaluation	0.30	0.30
Physical Research	8.00	8.00
Tobacco Fundamentals	11.70	8.20
Tobacco Materials	7.00	4.00
Tobacco Processing	2.00	2.00
TOTALS	37.35	30.80

*Does not include Executive and Administrative Services.

II. OUTSIDE EXPERTISE

A.	Dr. F. A. Zenz	Consulting on fluid-particle processing technology and the design of tobacco processing systems.
B.	Pemm-Corp.	Plexiglas modeling of tobacco handling systems.
C.	Creare, Inc.	Computer modeling expertise to support the development of tobacco processing systems.
D.	M. W. Kellogg	Engineering and design of various NET pilot processes.
E.	Securamax	Design and fabrication of a unique high pressure (1,000 psig) rotary valve for use in a continuous gas impregnation process.
F.	Foster Miller In	Design of a continuous gas phase impregnation system utilizing a linear-pocket conveyor.

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TECHNOLOGY TRANSFER

TECHNOLOGY:

New Expanded Tobacco Process

DESCRIPTION:

The transfer of technology for the NET process includes processing and equipment specifications for tobacco impregnation with gaseous CO_2 , expansion, gas/tobacco separation and reordering. This technology will be transferred to PM-USA Engineering as it is developed. A joint effort between R&D and Engineering is currently underway with commercialization of the batch gaseous CO_2 impregnation process.

TRANSFER DATE:

On-going.

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PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: R. Carchman Date: January 7, 1992

From: R. Kinser and R. McCuen

Subject: **Objectives, Strategies and Operational Plans for the Tobacco Biochemistry Major Program**

Plans for the new Tobacco Biochemistry program are attached. All of the individuals in the projects that make up the Program, one Visiting Scientist, and one of the Applied Research Directorate's Staff Scientists, have contributed to the preparation of this document.

/mps

cc:

D. Ayers
T. Burruss
E. Crockett
S. Davies
B. Davies
S. Drew
C. Ellis
R. Forte
O. Gaines
S. Hassam
S. Haut
W. Hempfling
R. Izac
R. Kaiser
P. Kurth
J. Lyle
V. Malik
N. McGee
T. Michalik
R. Morgan
H. Nakatani
G. Nixon
G. Patskan
M. Shulleeta
M.Steele
D. Turner
B. Vaughan
S. Wahab
T. Yu

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OBJECTIVE #1: To produce a consumer-acceptable cigarette with lowered biological activity.

STRATEGIES:

1. Determine the interactive effects of modifications of conventional cigarette construction on the S/M activity of CSC.

2. Develop the means to reduce undesirable precursors or to enhance desirable precursors.

3. Design a model cigarette whose CSC shows a 90% reduction in S/M activity when compared to the CSC obtained from 2R1 cigarettes.

4. Propose feasibility studies of new developments based on outside literature.

5. Investigate possible constituents of biological activity.

TACTICS AND TIMETABLE OR 1992:

DEVELOP A BASE MODEL FILLER WHICH WOULD HAVE LOW TSNA AND NO BOUND NICOTINE FROM WATER WASHED ORIENTAL FILLER FOR USE IN FURTHER MODEL DEVELOPMENT STUDIES.

Determine feasibility of preparing 500lbs of filler from water washed MT blend

Determine proper inorganics (to assist proper burn characteristics) and obtain analytical information on the cased filler. Deliver half to INBIFO **(Complete by 2nd Q)**

CIGARETTE CONSTRUCTION STUDY

Determine the interactive effect of cigarette construction parameters (blend component, paper porosity and paper additives, ventilation and filter efficiency) on S/M activity of CSC. **(Initiate 1st Q and complete 2nd Q)**

Identify further cigarette construction parameters for a second phase study, such as: various filters and cigarette circumferences **(Initiate 3rd Q)**

Determine feasibility of investigating the effect of peak coal temperature on the S/M activity of CSC **(Initiate 3rd Q)**

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ADDITIVE STUDIES

In coordination with the personnel at INBIFO, continue to study the effect on S/M activity of CSC obtained from cigarettes with the addition of selected amino acids (lysine, threonine, histidine, proline, serine and methionine) to bright or burley solubles **(Initiate 1st Q)**

Identify other compounds as precursors of bioactivity in the S/M assay **(Initiate 3rd Q)**

Determine the feasibility of using strong ion exchange to determine the precursors of S/M activity **(Initiate 3rd Q)**

CONSTITUENTS OF BIOLOGICAL ACTIVITY

Monitor outside scientific literature relevant to biological activity **(Ongoing)**

Obtain probes and implement protocols for analyzing heme oxygenase (HO) mRNA levels and performing nuclear run-on transcription assays in 3T3 cells **(Initiate 1 Q)**

Analyze HO mRNA levels and transcription rates in 3T3 cells which have been subjected to cyclohexamide and TPA treatments **(Initiate 2nd Q)**

Investigate using 2-D gel electrophoresis, 3 or more known growth-regulating proteins before and after treatment with promoters/CSC **(Initiate 1st Q)**

Investigate whether CSC affects expression/levels/sequence of potential key regulation proteins **(Initiate 3rd Q)**

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OPERATIONAL PLANS FOR 1993:

ADDITIVE STUDIES

Determine the feasibility of the use of "desmutagens" in reducing the S/M activity of CSC from cigarettes spiked with precursors. Review external and internal literature to identify potentially useful desmutagens **(Initiate 3rd Q)**

SELECTIVE REMOVAL OF UNDESIRABLE PRECURSORS

Develop methods for the removal of undesirable or precursors of undesirable compounds from water extracts of tobacco by using microorganisms or enzymes **(Initiate 3rd Q)**

BEST MODEL

Use a combination of developed methods to produce a consumer-acceptable model cigarette whose CSC is reduced in S/M activity **(Initiate 3rd Q)**

Establish a protocol for submitting best model cigarette for smoking evaluation **(Initiate 4th Q)**

OBJECTIVE #2: To alter tobacco plants in order to develop consumer acceptable cigarettes or other usable products.

STRATEGIES:

1. Modify tobacco plants to produce the lowest possible levels of alkaloids.
2. Develop tobacco plants with increased resistance to pests.
3. Improve the agronomic, processing or chemical compositional characteristics of tobacco.
4. Develop tobacco plants whose lamina demonstrate increased resistance to pests and microbial degradation during storage.
5. Investigate the usefulness of using tobacco plants as bioreactors.
6. Modify the tobacco plant to maintain MS tobacco alkaloids but reduce other smoke components.

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TACTICS AND TIMETABLE FOR 1992:

A. Modify alkaloid metabolism

1. PMT

   a. Determine additional sequence **(Initiate 1st Q)**

   b. Isolate/identify gene(s) for PMT **(Complete 4th Q)**

      (1) Determine feasibility of using PCR **(2nd Q)**
      (2) Southern blot analysis of genomic DNA with probes for PMT **(2nd Q)**
      (3) Determine feasibility of using nonradioactive detection methods for isolation/identification of PMT **(Initiate 1st Q)**

   c. Screen expression library using Ab to N-terminal sequence of PMT **(Initiate 2nd Q)**

   d. Make anti-sense constructs with cDNA sequence obtained from antibody screen **(Initiate 3rd Q)**

   e. Obtain transgenic tobacco plants after transformation with anti-sense DNA **(Ongoing)**

   f. Analyze transgenic tobacco plants for evidence of anti-sense cDNA incorporation and expression **(Initiate 1st Q)**

2. Use differential hybridization to look for additional root specific genes **(Initiate 1st Q but only if visiting scientist is recruited)**

3. Begin the isolation of N-methylputrescine oxidase **(Initiate 1st Q)**

   a. Develop MPO assay **(1st Q)**

   b. Determine characteristics of MPO **(Initiate Feb. 1)**

      (1) Standard biochemical measurements
      (2) Inhibition studies

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c. Isolate MPO

(1) Assay Phenyl-Sepharose fraction for MPO activity **(2nd Q)**
(2) Examine anion exchange column(s) **(Initiate 2nd Q)**
(3) Examine metal chelate chromatography **(Initiate 1st Q)**
(4) ExamineHPLCchromatographiccolumnmethodologies**(2nd Q)**
(5) Examine via 2-D analysis **(3rd Q)**

d. Examine enzyme stability

(1) Activity staining methods **(Initiate 1st Q)**
(2) In presence of various compounds **(Initiate Feb. 1)**

4. Begin isolation of Nicotine Synthetase **(Initiate 1st Q)**

5. Begin work on the use of nicotine degrading enzymes and their respective coding genetic responses **(Initiate 1 Q)**

6. Identify <u>outside</u> facility for implementation of transgenic activities **(4th Q)**

7. Investigate feasibility of altering tobacco plant to yield a cigarette with normal MS nicotine delivery but minimal delivery of other organic components **(Initiate 4th Q)**

<u>TACTICS AND TIMETABLE FOR 1993</u>:

A. Pest resistance

1. Present a comprehensive review of the <u>Bacillus thuringiensis</u> literature to management **(1st Q)**

2. In collaboration with FTR personnel develop a screen for prokaryotic organisms which have activity against CBs **(1st and 2nd Q)**

3. In collaboration with FTR personnel screen prokaryotic organisms for activity against CBs **(2nd Q and continuing)**

B. Improve agronomic, processing or chemical composition characteristics.

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1. Determine those agronomic, processing or chemical compositional characteristics whose changes will result in an improved product precursor/ product. Determine feasibility of altering those characteristics. If feasible, prepare a memo outlining a course of action based on that determination **(Complete by the end of 3rd Q)**

C. Improve storage stability

1. Determine those physical/biochemical characteristics which would improve the long-term storage of tobacco. If feasible to alter/modify those characteristics, prepare a a memo outlining that course of action based on that determination **(Complete by the end of 3rd Q)**

D. Investigate tobacco cells as bioreactors

1. Determine the potential PM needs of any expensive/difficult-to-obtain/ seasonal compounds/biochemicals/proteins/ plant cell materials compound. Determine the feasibility of producing those compounds using genetically/biochemically modified tobacco or tobacco cell tissue culture. If feasible, prepare a memo documenting a course of action based on that determination **(Complete by the end of 4th Q)**

OBJECTIVE #3: To use biological systems to produce usable products.

STRATEGY

1. Use modified plant/plant tissue culture/bacterial systems to produce flavors/chemicals/materials which can be of use to PM.

TACTICS AND TIMEBABLE FOR 1992:

A. Produce compounds of interest to PM.

1. Determine the potential PM needs of any expensive/difficult-to-obtain/seasonal compounds/biochemicals/proteins/plant cell materials. Determine the feasibility of producing those compounds using genetically/biochemically modified tobacco or tobacco cell tissue culture. If feasible, prepare a memo documenting a course of action based on that determination **(Complete by the end of 4th Q)**

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OBJECTIVE #4: To produce consumer-acceptable cigarettes with reduced levels of undesirable compounds.

STRATEGIES:

1. Devise methods to reduce MS NNK formed from bound precursors during smoking.

2. Reduce MS TSNA by modification of cigarette construction parameters.

3. Reduce MS TSNA by selective physical removal of TSNA and TSNA precursors.

4. Reduce MS TSNA by adding inhibitors of nitrosation or agents to decrease transfer of preformed TSNA.

5. Reduce MS TSNA by use of tobaccos naturally low in preformed TSNA, minor alkaloids, and/or nitrosating agents.

6. Investigate PM processing methods to determine potential for modifications that would reduce MS TSNA.

7. Determine compounds of interest as candidates for reduction in cigarette smoke.

TACTICS AND TIMETABLE FOR 1992:

MS NNK REDUCTION STRATEGY:

Verify relationship between bound Nicotine and bound NNK:

Determine time course of bound nicotine and bound NNK formation during air-curing:

Measure levels of NIC-X, NIC-Y and bound NNK in greenhouse and field grown Bu 21 **(Initiate 1st Q)**

Evaluate results **(Complete 2nd Q)**

Measure levels of NIC-X and NIC-Y in various tobacco fillers **(Ongoing)**

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Isolation and structures of different forms of bound nicotine and bound NNK:

Development of isolation methods for NIC-X, NIC-Y & bound NNK:

Chromatography of extracts from ART Bu **(Initiate 1st Q)**

Enrichment by acid digestion of marc from hot water wash of ART Bu **(Initiate 2nd Q)**

Enzyme digestion of acid marc **(Initiate 2nd Q)**

Remove cellulose from ART Bu (N-Methylmorpholine-N-oxide digestion) **(Initiate 2nd Q)**

Determine chirality of nicotine liberated by alkaline digestion **(Initiate 1st Q)**

Evaluate structures (nature of substrates) of bound materials **(Complete 4th Q)**

Synthesis of bound nicotine and bound NNK:

In vitro coupling of nicotine to known and/or extracted phenolics (synthetically bound nicotine **(Initiate 1st Q)**

Enzyme-catalyzed synthesis of bound nicotine: Reaction of nicotine with phenylpropanoids + peroxide **(Initiate 2nd Q)**

Investigate the oxidation and nitrosation of synthetically bound nicotine, followed by release of NNK *via* pyrolysis or alkaline digestion **(Initiate 3rd Q)**

Determine the structure of synthetically bound nicotine **(Complete 4th Q)**

Study the release of MS NNK from preformed bound NNK during smoking:

Determination of alkali-releasable NNK from water-extracted fillers **(Complete 2nd Q)**

Development of pyrolytic means of liberation of NNK from bound NNK sources such as water-extracted fillers, isolated bound nicotines **(Complete 2nd Q)**

Determination of NNK releasable from various marcs and isolated/synthesized sources of bound NNK **(When available)**

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CIGARETTE CONSTRUCTION PARAMETER STRATEGY:

Systematic (e.g. response-surface-studies) evaluation of cigarette construction/MS TSNA delivery:

Determine MS TSNA/dry TPM and obtain CTSD data for cigarettes used in above study, with plugs pulled/holes taped **(Complete 2nd Q)**

Determine MS TSNA/dry TPM for the construction parameters included in above study and compare data with the same ratio determined with no dilution or filter; use as predictor for MS TSNA of a given cigt. **(Complete 2nd Q)**

REDUCTION OF MS TSNA BY PHYSICAL REMOVAL OF PREFORMED TSNA OR THEIR PRECURSORS, OR BY ADDING INHIBITORS:

1st Generation Low-TSNA Laboratory Model:

Evaluate potential for product development of the 1st Generation Low-TSNA Model **(1st Q)**

> If there is potential, reconstruct the Low-TSNA Blend developed using ethanol extraction **(2nd Q)**
>
> Transfer technology for Low-TSNA Blend to Flavor Development for final formulation and panel testing **(2nd Q)**

Further process development for removing bound NNK and other MS TSNA precursors:

Determine the feasibility of using supercritical CO_2 modified with a polar additive for removal of TSNA and secondary amine alkaloids **(Initiate 1st Q)**

Determine the feasibility of using a supercritical fluid other than CO_2 for removal of TSNA and secondary amine alkaloids **(Initiate 2nd Q)**

Develop a low-TSNA model based on a water-washed filler to which the concentrated washings are applied after removal of alkaloids & TSNA *via* cation exchange **(Initiate 2nd Q)**

Devise means to reduce MS NNK derived from bound NNK based on the best information at hand **(Complete 4th Q)**

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Use all information available to establish the lowest possible MS TSNA delivery in a full flavored blended cigarette.

2nd Generation Low-TSNA Laboratory Model:

Formulate a new Low-TSNA Model based on technology determined to date **(Complete 4th Q)**

USING TOBACCOS NATURALLY LOW IN PRODUCTION OF MS TSNA STRATEGY:

Investigate the possibility of utilizing tobaccos which are naturally low in production of MS TSNA:

Obtain samples of burley grades from 1988, 1989, and 1990 crop years and determine preformed and MS TSNA levels as well as alkaloids, etc. **(Complete 1st Q)**

Compare DBC burley versions for the three years studied with the above data and determine whether there are individual grades that make significant contributions to MS TSNA of the blend **(Complete 2nd Q)**

Repeat the above for bright **(Initiate 2nd Q)**

Continue interaction with Leaf to monitor available grades **(Ongoing)**

PROCESSING METHODS STRATEGY:

Study existing PM processing techniques to determine practical approaches for reducing MS TSNA:

Assemble all data available on the effects of PM processes on MS TSNA delivery **(Initiate 1st Q)**

Obtain data on other processes believed to have potential impact on MS TSNA **(Ongoing)**

Determine possible steps to reduced TSNA based on an examination of all the above data **(Complete 3rd Q)**

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Determine effect of adding antioxidants to SEL on MS TSNA delivery of Pilot Plant RL **(Initiate 2nd Q)**

Determine the effect of removing nitrate from BuCEL *via* electrodialysis on MS TSNA from BuCEL/BrBW **(1st Q)**

ANALYTICAL METHODS DEVELOPMENT (Support for above strategies):

Replace one HP 5790 GC with a HP 5890 GC, and establish protocol for computer-operated GC/TEA analysis **(Complete 1st Q)**

Improve GC parameters used for GC/TEA **(Ongoing)**

Develop an SCFE method for filler TSNA **(Complete 3rd Q)**

TACTICS AND TIMETABLE FOR 1993:

Determine whether there are significant sources of MS NNK other than bound NNK and transfer of preformed NNK; e.g., pseudooxynicotine (PsON) or N-methylmyosmine (NMM)

Determine if there is interest in further development of the 2nd Generation Low-TSNA Model.

> *if yes:* transfer technology for new Low-TSNA model to Development for further formulation and panel testing **(3rd Q)**

Propose methods for reduction of other undesirable compounds.

Continue to monitor available grades of specific blend components for TSNA levels.

Continue to evaluate PM processing methods and propose studies to determine methods for reducing MS TSNA.

2021530058

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CAST LEAF DEVELOPMENT PROGRAM

September 25, 1991

2021530059

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Cast Leaf Program

Objectives

1. Implement a Cast Leaf process that will provide flexibility in meeting capacity needs for individual sheet types.

2. Optimize the current RCB process for sheet physical properties, production capacity, and environmental goals.

3. Support R&D programs requiring non-standard sheet.

2021530060

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

OBJECTIVE 1

Implement a cast leaf process that will provide flexibility in meeting capacity needs for individual sheet types.

Status & Background

The reconstituted tobacco capacity of PM is rapidly becoming insufficient to meet future growth.

Strategies

1. **Develop the business plan for meeting sheet requirements**, to support a decision for timing and site selection of a Cast Leaf Facility.

2. **Develop Cast Leaf product**, formulated from available feedstocks, with sheet physicals, burn characteristics, and subjectives comparable to RL (Cast Leaf) and RCB (New BL).

3. **Define the Cast Leaf process** with optimum process and equipment requirements defined for the selected binder system.

2021530061

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Cast Leaf Program

Strategy 1

Develop the business plan for meeting sheet requirements, to support a decision for timing and site selection of a Cast Leaf Facility.

Tactics

1.1 Develop PM USA/Europe material balance for OTM and reconstituted sheet needs.

1.1.1	Identify source and verify accuracy of PM USA forecasted requirements of sheet needs and OTM availability.	Complete
1.1.2	Identify source and verify accuracy of European forecasted requirements of sheet needs and OTM availability.	Complete
1.1.3	Develop material balance model and initiate protocol for routine updates.	4th Qtr 91
1.1.4	Obtain commitments for feedstock availability for Cast Leaf.	1st Qtr 92

1.2 Establish source and capacity of suppliers of reconstituted sheet.

1.2.1	Define capacity of BL plant and develop strategy for capacity increase, including capital requirements and timing.	4th Qtr 91
1.2.2	Define capacity for Park 500 and develop strategy for capacity increase, including capital requirements and timing.	4th Qtr 91
1.2.3	Establish availability of sheet from alternate suppliers. Qualify for use for PM USA and PME.	4th Qtr 91

- Venezuela RCB
- LTR RLTC
- American RLTC
- Schweitzer RLTC

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Strategy 1

1.3 Conduct economic analysis of options for meeting sheet requirements.

1.3.1	Develop economic model identifying least cost alternative for meeting sheet requirements.	Complete
1.3.2	Utilize economic model to develop decision matrix for selection of alternative suppliers of sheet and/or implementation of a Cast Leaf process.	4th Qtr 91
1.3.3	Confirm results of economic model through Operations Analysis.	1st Qtr 92

2021530063

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Strategy 2

Develop a Cast Leaf product, formulated from available feedstocks, with sheet physicals, burn characteristics, and subjectives comparable to RL (Cast Leaf) and RCB (New BL).

Tactics

2.1 Construct and operate a cast leaf laboratory to generate sheet materials for evaluations in machine made cigarettes.

2.2 Selection of feedstock and binder system.

2.2.1	Conduct screening of binder systems based on film forming characteristics, physicals and subjective acceptability.	Complete
2.2.2	Optimize Cast Leaf Product through studies to establish binder characteristics impacting sheet physicals and interactive affects between binder, solvent, tobacco and additives.	2nd Qtr 92
2.2.3	Establish QA methodology for qualification of binder and raw materials.	1st Qtr 93

2.3 Development of flavor additives to achieve subjective response. 2nd Qtr 92

2.3.1	Establish subjective target for Cast Leaf.	
2.3.2	Establish methodology for mapping subjective response as function of binder, tobacco and flavor additives.	

2.4 Qualification of Cast Leaf product for both PM USA and European blends. 1st Qtr 93

2021530064

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Strategy 3

Define the Cast Leaf process with optimum process and equipment requirements defined for the selected binder system.

Tactics

3.1 Install Cast Leaf pilot plant to conduct process development for the Cast Leaf product.

3.1.1	Install, startup and debug pilot plant operation.	4th Qtr 91
3.1.2	Qualify process for production of pilot RCB with subjective equivalence to standard RCB production.	1st Qtr 92
3.1.3	Develop and optimize process for production of New BL. Subjectively qualify New BL versus standard process RCB.	1st Qtr 92
3.1.4	Develop and optimize process for production of Cast Leaf. Subjectively qualify Cast Leaf for PM USA and European blends.	2nd Qtr 92

3.2 Define technical design criteria for Commercial Plant. 3rd Qtr 92

3.3 Complete Process Development and transfer Cast Leaf process technology to Engineering for commercial implementation. 1st Qtr 93

2021530065

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

OBJECTIVE 2

Optimize the current RCB process for sheet physical properties, production capacity, and environmental goals.

Status & Background

The survivability of RCB through cigarette making is lower than RL and this differential sheet quality should be reduced. The BL process also uses washed burley stems and the extract from the stem washing operation should be reduced to keep within the increasingly stringent effluent standards.

Strategy 1

Utilize the Cast Leaf pilot plant to develop new technology applicable to the present RCB process to improve sheet quality without changing RCB subjective character or delivery.

Tactics

1.1 Quantify the effect of tobacco grind size on RCB quality and production rate. Develop strategy to determine capacity increase potential jointly with engineering and operations.

- 2nd Qtr 1992

1.2 Reduce the air content of RCB slurry to reduce the sheet pinholes which cause smaller sieve fractions when the sheet is cut into filler.

- 1992

Strategy 2

Reduce the environmental impact of the RCB process.

Tactics

2.1 Evaluate the impact of eliminating Burley Stem washing on RCB.

- 4th Qtr 1991

2021530066

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

OBJECTIVE 3

Support R&D programs requiring non-standard Cast Leaf.

Status & Background

We have no facility to explore the characteristics of new cast products until we complete the pilot plant.

Strategy

Generate sufficient quantities of novel Cast Leaf products to establish their potential in machine made cigarettes.

-1992

Tactics

Provide cast products of novel composition to support programs requiring special cigarette properties (burn rate control, tar delivery, feedstocks, humectants, LBA, low sidestream, etc.).

2021530067

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

RESOURCE ALLOCATION
CAST LEAF PROCESS

	1991	1992	1993	1994	1995
Analytical Research	2.0	2.0	2.5	2.5	2.5
Biochemical Research					
Computer Applications					
Chemical Research	-	1.0	1.0	-	-
Cigarette Development					
Cigarette Technology					
Cigarette Testing Services	0.5	1.0	1.0	1.0	1.0
Development Engineering	0.8	0.8	0.5	0.5	0.5
Flavor Development	0.7	0.5	0.5	0.1	0.1
Product Evaluation	0	0.3	0.3	0.2	0.1
Physical Research	0.3	0.3	0.2	0.1	0
Technology Assessment	0.4	0.5	0.6	0.8	0.8
Technical Information Services					
Tobacco Fundamentals	3.0	3.0	3.0	3.0	3.0
Reconstituted Tobacco Division	12.0	12.0	12.0	12.0	12.0
Tobacco Process & Fabrication	1.0	0.8	0.8	0.8	0.8
Total	20.7	22.2	22.4	21.0	20.8

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PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: Distribution

Date: December 6, 1991

From: S. E. Clark

Subject: NEW PRIMARY PROCESS - SCHEDULE

Attached is a schedule for the New Primary Process which is focused on obtaining a basis for design by the end of 1992.

Included in the time-line are major areas of responsibility and major activities required to achieve the objective. Please use this information for your planning. Give me a call if there are any questions.

Distribution
R&D Directors
R&D Managers
A. C. Lilly, Jr.
W. E. Poorbaugh
G. B. Reid
H. L. Spielberg
W. P. Taylor

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NEW PRIMARY PROCESS

Task Name	Durati (Days)	Start	Finish
DIRECT CYLINDER CONDITIONER	186	5-Dec-91	31-Aug-92
ORDER DCC	17	5-Dec-91	31-Dec-91
DCC FABRICATION	49	2-Jan-92	6-Mar-92
INSTALLATION	7	6-Mar-92	16-Mar-92
QUALIFICATION	12	16-Mar-92	31-Mar-92
TESTING	40	4-May-92	30-Jun-92
SEPARATOR AIR LEG	33	16-Jul-92	31-Aug-92
CUTTING OPTIMIZATION	201	2-Jan-92	16-Oct-92
RELOCATE CUTTER & STM. TUNNEL	21	3-Feb-92	28-Feb-92
INSTALL NEW FORCE FEED SYSTEM	21	3-Feb-92	28-Feb-92
FACTORIAL TESTS ON EACH COMP.	42	2-Mar-92	30-Apr-92
FUNDAMENTAL STUDIES	65	3-Jan-92	31-Mar-92
PURCHASE HEATER	22	2-Jan-92	31-Jan-92
INSTALL HEATER	18	4-May-92	29-May-92
FACTORIAL TESTS	44	1-Jun-92	31-Jul-92
COMAS CUTTING HEAD TESTING	43	17-Aug-92	16-Oct-92
BURLEY PROCESS	250	2-Jan-92	30-Dec-92
FUNDEMENTAL STUDY COMPLETE	148	2-Jan-92	31-Jul-92
BS,CURRENT PROCESS CHEMISTRY	148	2-Jan-92	31-Jul-92
CASED CUTTING	85	1-Jul-92	30-Oct-92
CASED CUT DRYING	102	3-Aug-92	30-Dec-92
COMP. DRYING (ST. TUN,ROT.DRY)	268	4-Dec-91	30-Dec-92
PURCHASE DRYER	17	4-Dec-91	30-Dec-91
COMPONENT TESTING (S/W HAUNI)	66	6-Jan-92	2-Apr-92
DRYER INSTALLATION	20	1-Sep-92	30-Sep-92
COMPONENT TEST CONFIRMITY	22	1-Oct-92	30-Oct-92
PROCESS INTEGRATION TESTING	39	2-Nov-92	30-Dec-92
MAKER FEEDER EQUIPMENT	249	6-Jan-92	31-Dec-92
CONCEPT DEVELOPMENT	124	6-Jan-92	30-Jun-92
PROTOTYPE DEVELOPMENT	125	2-Mar-92	31-Aug-92
PROTOTYPE EVALUATION	125	1-Jul-92	31-Dec-92
MAKER DEVELOPMENT	250	2-Jan-92	30-Dec-92
EQUIPMENT FUNDING FOR PROTOS	22	2-Jan-92	31-Jan-92
PROTOS 9000 DESIGN	126	2-Jan-92	30-Jun-92
PROTOS 8000 INSTALL (PARK-II)	21	1-Jul-92	30-Jul-92
EVAL. OF MAKER W/BASE FILLER	21	3-Aug-92	31-Aug-92
NEW HOPPER EVALUATION	21	3-Aug-92	31-Aug-92
SYSTEM EVALUATION	81	1-Sep-92	30-Dec-92
MK-9 HOPPER	126	2-Jan-92	30-Jun-92
COMPLETE S/W EVALUATION	66	2-Jan-92	31-Mar-92
EVALUATE IN FACTORY	60	1-Apr-92	30-Jun-92
PROTOS HOPPER	211	2-Jan-92	30-Oct-92

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EST. COST & IMPROV. PLAN	45
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DEVELOP 650,APPROV. FOR SEED $	17
OBTAIN APPROVAL FOR 650	43
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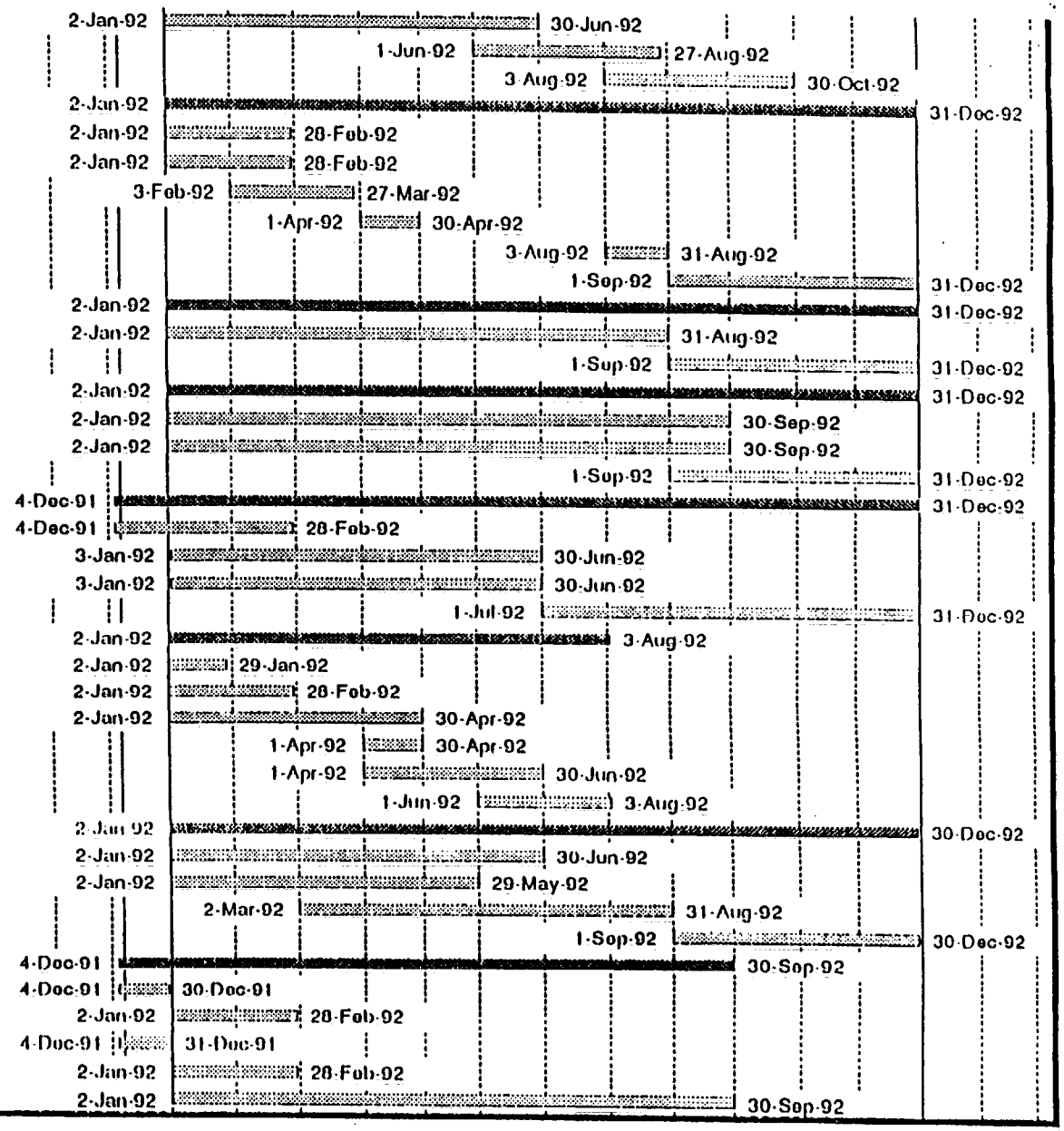

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Direct Cylinder Conditioner

Concept: Individual components are opened, moistened to 16 ± 2% O.V., beetle kill is achieved, and base flavors are applied. Base flavors are primarily humectants.

Scope: Utilize the work done by Engineering at Cabarrus to establish beetle kill conditions, exit temperature, and OV targets for each component. Purchase and install DCC in Semiworks.

Verify the conditions necessary for beetle kill - not subjective parity with the total blend process. If they are different, establish the chemical differences as a function of process conditions.

Develop flavor application and control system for base flavors. Focus will be Bright, Oriental and Burley with and without subsequent Burley Spray process.

Separator evaluation in conjunction with Engineering's work as well as scheme for incorporating contaminant removal down stream of DCC.

Schedule:

Order DCC	12/91
DCC Fabrication	3/92
Install/Start-up	3/92
Qualification	3/92
Testing	4/92-6/92
Separator Air Leg	7/92

2021530072

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Cutting Optimization

Concept: Individual Blend Components will be cut at moderate OV's (~15%) and elevated temperature to achieve optimal cut quality, size distribution as well as optimal cut width and strand length.

Scope: Given the expected temperature/OV history of each component prior to the cutting process, establish the cutter operating conditions for the optimal temperature/OV cutting envelope.

Establish techniques for width and length control. Evaluate Comus cutting drum.

Late in the program optimize width and length for survivability and CM performance with existing maker hopper as well as planned improvements.

Schedule:

Fundamental Studies	1/92-3/92
Purchase heater	1/92
Install new Forced Feed System	2/92
Relocate existing cutter (RC3) and steam tunnel To the Semiworks from DPP	2/92
Factorial tests on each component	3/92-4/92
Install heater	5/92
Factorial tests	6/92-8/92
Comus Cutting Head Testing	8/92-10/92

2021530073

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Burley Process

Concept: Burley Spray (current formula or cooked B.S.) is applied to strip, the strip is cut, additional flavors may be added, and then dried in a non-P&S apron dryer.

Scope: Establish the basics of the Burley Spray reaction for the existing process. Questions such as:

- Is there reaction actually between the B.S. and the Burley or a reaction of B.S. at the temperature in the dryer?
- Can the necessary reaction products be "cooked" and then applied to the strip?

Establish strip preparation conditions for B.S. application, e.g. is steam tunnel opening necessary. Does pre-moistening provide any advantage to flavor system performance?.

Spray application - Is strip opening and moistening prior to spray application in a rotary cylinder beneficial? What technique other than a rotary cylinder will provide improved flavor application and adequate control.

Verify that a rotary dryer after casing and cutting will accomplish the required heat treatment and drying for this process. Would other dryer designs or energy sources be more effective?

Schedule:

Fundamental Study Complete B.S., Current Process Chemistry,	1/92-7/92
Cased Cutting	8/92-10/92
Cased Cut Drying	8/92-12/92

2021530074

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Component Drying - (Steam Tunnel and Rotary Dryer)

Concept: After passing thru a steaming tunnel Bright, Oriental and Burley cut fillers are dried in a rotary dryer. This process enhances CV by a combination of mechanisms.

SCI will be evaluated as a partial expansion and setting operation for the NPP within the NET Program.

RL may benefit from a similar process. BL will not require this process step.

Does the Hauni Tunnel offer any positive contribution to the CV enhancement or negative impact on sieve distribution exit the dryer?

Scope: Approximate temperature/OV/time variables for each component prior to steam tunnel.

Evaluate physical property performance for each component at a range of inlet OV's with and without the steam tunnel.

Schedule:		
	Purchase Dryer	12/91
	Component testing	
	Semiwork's Hauni	1/92-4/92
	Dryer Installation	9/92
	Component Test Confirmation	10/92
	Process Integration Testing	11/92-12/92

2021530075

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Maker Feeder Equipment

Concept: The new hoppers will be fed from above by a non-pneumatic delivery system developed in this project. The delivery system will be of two basic designs - one for a facility where tobacco storage is above the maker and the second is for a facility where tobacco is on level with or below the maker.

Scope: In coordination with the Material Handling and Maker Development devise the container unloading mechanism that is close coupled to a maker where the storage area is above the maker. In a facility where storage is on level with or below the maker devise non-pneumatic delivery and distribution system.

Schedule:		
	Concept Development	1/92-6/92
	Prototype Development	3/92-8/92
	Prototype Evaluation	7/92-12/92

2021530076

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Maker Development

Concept: Focal point will be Protos 8000 per York Rebuild Standard. This will include the improvements associated with the PARK-II project.

For the NPP the emphasis will include design changes which emphasize uniformity of cigarette physical properties for the new primary filler. Coordination of this effort is required between Cigarette Design and the unit operation work within the NPP to optimize filler and component size distribution, strand dimensions, and cigarette firmness and weight reduction potential.

This element will also develop and qualify maker hoppers for the Mark-9's and Protos 8000 making machines.

Scope: Engineering will utilize the Protos-9000 for initial development work on the suction tape garniture transition as well as weight control schemes. This will continue thru June of 1992.

Funds will be obtained to purchase and install a Protos from York with PARK-II enhancements as appropriate in the Semiworks by July 1992.

Coordinated design modifications, cigarettes design changes and unit operation optimization will continue thru 1992 to maximize maker performance at maximum weight reduction.

Schedule:

Equipment funding for Protos	1/92
Protos 9000 design	1/92-6/92
Protos 8000 installation (PARK-II)	7/92
Evaluation of Maker with base filler	8/92
New Hopper evaluation	8/92
System optimization	9/92-12/92
MK-9 Hopper	
Complete S. W. evaluation	1/92-3/92
Evaluate in factory	4/92-6/92
Protos Hopper	
Engr. Development	1/92-6/92
Prototype Delivery	6/92-8/92
Prototype Evaluation	8/92-10/92

2021530077

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Material Handling and Blending

Concept: Individual components will be processed and stored as cut components. The components will be fed in proper ratio for a blend, aftercut applied and blended in a silo. Finished filler will be withdrawn from the silo and placed in small (500-1000#) containers which are delivered to individual makers on an as demand basis.

The concept must be modeled to optimize both component storage and cut filler storage.

Scope: Verify the blending concept provides equivalent and/or improved blend uniformity compared to the current total blend process. Develop gentle flow splitting and mixing devices for transport system if the blending operation following AC application is not adequate.

Identify and evaluate storage system devices. In conjunction with cigarette design, subjectives and maker development efforts establish filler hold time requirements.

Minimize filler degradation within process.

Support retrofit concept evaluations.

Schedule:

Verify blend equivalency to Total Blend Process	1/92-2/92
Model for Cabarrus Facility - optimization	1/92-2/92
Concept alternatives and Vendor Surveys	2/92-3/92
Prototype Purchase	4/92
Prototype Installation	8/92
Evaluation/Modification	9/92-12/92

2021530078

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Subjective Mapping

Concept: Process variables such as temperature, OV, time and flavor systems interact to impact taste. By altering controllable variables component and blend taste can be altered.

Scope: Throughout the program components processed at different process conditions will be evaluated with respect to a selected list of attributes.

Based on the mapping of taste response to variables, provide directional input to the unit operations efforts which will be used to adjust component contribution to the taste of the blended cigarette.

Close coordination with cigarette design and the flavor effort will be required.

The impact of flavor transfer within the total blend process and its relationship to the component processed filler will also be investigated.

Schedule:		
	Component mapping	1/92-8/92
	Blended cigarettes evaluations and adjustments	9/92-12/92

2021530079

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Cigarette Design

Concept: The NPP will produce filler which can have its taste altered, will utilize NET or DIET, and be of controlled strand size.

Scope: Develop construction specifications which complement filler, taste and delivery characteristics to produce a cigarette equivalent to existing products.

Schedule:		
	Participation taste evaluations of component testing	1/92-9/92
	Construction adjustments for constant	1/92-9/92
	delivery at reduced weight	1/92-9/92
	Construction adjustments for product targets	9/92-12/92

2021530080

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Advanced Controls

Concept: The NPP will utilize a simplified process equipment scheme which will have a significant dependence upon product sensors, ratio controls in feed forward and feed back modes. New sensors will be evaluated/developed to meet these needs. The use of dynamic system tuning will be required. Advanced control concepts utilizing technologies such as AI, Fuzzy Logic, Neural network.

Scope: Develop basic control philosoply, hardware requirements and software strategy for the blend integration of NPP for the initial Semiworks upgrade.

Identify sensor hardware which detects chemical characteristics of components as processed. Identify sensors appropriate for unit operations to be developed in the NPP with respect to the scale of the Semiworks and temp, humidity, etc.

Schedule:

Upgrade scope development and sensor identification and design	12/91-2/92
Specialty chemical sensor hardware identification	1/92-6/92
C.M. weight control design	1/92-6/92
Optimization of control strategies	7/92-12/92

2021530081

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Business Analysis

Concept: The Cabarrus Expansion will utilize the NPP to achieve product and flexibility advantages.

Segments of the NPP can be incorporated into existing facilities on a cost justified basis.

The economic advantages for each facility will determine the extent to which elements of the NPP is incorporated into the facility.

Scope: Assess the current design and procurement position on the Cabarrus project relative to the NPP. Establish design change and cancellation charge budget. Exercise model for Cabarrus operation as well as other primaries to establish potential benefit from redesign/retrofit.

Assess retrofit potential as a function of existing facility and facility modification. Coordinate planning with input from Production planning scheduling.

Evaluate alternative C.M. operating configurations which complement the cut filler delivery system.

Does the relocation of DIET to Bermuda from the MC, offer an opportunity to increase the MC capacity and supply Stockton Street with filler? How will export cut filler be handled if Stockton Street Primary is shut down? What are economics?

Based on economics develop implementation schedule and cost estimate for capital work.

Schedule:

Assess Cabarrus Status/Budget	1/92
Upgrade Model for each primary	1/92-2/92
Optimize retrofit potentials	1/92-4/92
Integrate retrofit with Production Planning	4/92
Establish Global US Plan	4/92-6/92
Establish cost and implementation plan	6/92-8/92

2021530082

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Flavor/Humectant Reallocation

Concept: A base flavoring is added to Bright, Oriental and possibly Burley in the DCC. Brand specific Flavorings are added in Aftercut.

Flavor system design will attempt to minimize VOC emissions as well as ambient VOC's.

The flavor transfer issue will be evaluated and become an additional guideline for reallocation.

Scope: Participate with Unit Operations and Subjective mapping effort to gain understanding of the NPP.

With Subjective effort, establish the technical basis for flavor carriers to the cigarettes e.g. Is it important which component carries flavor to the cigarette or is it sufficient for the flavor to be on some component or components.

The ratio of flavor to component may need to be increased to maintain subjectives of the cigarette at reduced weight.

Schedule:

Unit Operations and Subjective Mapping	1/92-6/92
Flavor transfer, determination of importance	1/92-5/92
Flavor to component ratio analysis	3/92-8/92
Flavor system optimization	9/92-12/92

2021530083

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

Element Description: Semiworks Reconfiguration

Concept: The Semiworks will be reconfigured and operational for testing of the NPP line configuration while maintaining total blend capability by the end of the third quarter in 1992.

Schedule:		
	Develop 650, obtain approval for seed money	12/91
	Accelerated equipment procurement	12/91
	Obtain approval for 650	1/92-2/92
	Complete design	1/92-2/92
	Complete construction	1/92-9/92

2021530084

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: Dr. Jerry Whidby Date: September 9, 1991

From: R. W. Dwyer

Subject: Current Operational Plan for Project Tomorrow

PROJECT TOMORROW

OBJECTIVE:

To evaluate the feasibility of developing an ignition-propensity test for cigarettes and to evaluate the technical and commercial feasibility of making cigarettes with reduced ignition propensities with respect to such a test.

STATUS AND BACKGROUND:

On August 10, 1990, the Fire Safe Cigarette Act was signed into law. This law empowers the Consumer Product Safety Commission to direct the National Institute of Standards and Technology's Center for Fire Research to complete research on cigarette fire safety. Specifically, this law calls for CFR to develop a standard method for determining cigarette ignition propensities, to compile performance data for cigarettes using this standard method, and to conduct laboratory studies on and computer modelling of ignition physics.

In an effort to maintain our products as the best in the market, we are examining the question of their fire safety. The challenge is to determine if there is any reliable test for assessing cigarette fire safety or ignition propensity. If so, we then need to evaluate our ability to manufacture and sell products which show improved performance with respect to such a test.

It has been demonstrated that bands of materials applied to cigarette wrappers can reduce the mass burn rates of cigarettes made with these wrappers. In fact, such bands can cause extinguishment of freely smouldering cigarettes. To date, we have examined sol-gels, inorganic salts, cellulose suspensions, and paper strips as banding materials. The suspensions and strips appear promising. One anticipated problem with reduced-burn-rate zones is increased puff counts. However, recent experimental results suggest that zones of inorganic wrapper additives may cause more tobacco to be burned either during or directly after a puff, thereby reducing puff counts. Another major concern is the manufacture of banded wrappers. Jim Myracle's design of a modified ring tipper has been implemented and demonstrated to work on a laboratory scale. Printing technologies have shown promise in applying cellulose suspensions. Machine-made wrappers of both types have been used to fabricate cigarettes which have extinguished during free smoulder within the bands.

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Another problem facing this program is the lack of an official cigarette ignition-propensity test. With such a test, we could design wrapper band-patterns to meet test standards. Our approach at this time is to design patterns such that the band width is just short of causing extinguishment during free smoulder and the band density does not seriously increase puff count. Our assumption is that we do not want to make cigarettes which will extinguish during free smoulder.

The Paper Technology Program has formulated detailed plans for the development of processes to apply bands to papers. Their plans include wet techniques such as the "daubing dandy" as well as printing technologies such as gravure, ink jet, and strip coating. Tim Callaham and John Hearn have issued their plans for refining our current version of the strip applicator. The plans given below under Strategy 4 include only the efforts to be undertaken within Project Tomorrow on burn-control zones in cigarette wrappers.

STRATEGIES:

- 1 Evaluate the feasibility of developing a test for cigarette ignition propensities and determine the extent to which cigarette design parameters influence their performance with respect to such a test.

- 2 Develop a computer model of a smouldering cigarette in contact with a substrate in order to evaluate the effects of cigarette and fabric properties on ignition.

- 3 Design cigarettes at reduced mass burn rates while maintaining consumer-acceptable delivery, physical, and subjective properties to the greatest extent possible.

- 4 Explore new technologies which may lead to more fire-safe cigarettes.

TACTICS AND TIMETABLE:

Strategy 1. Test Development

1. Evaluate the effects of fabric type, burn-promotion additives, and draft rates on the ignition of fabric/foam substrates. (2Q92)

2. Experimentally determine the thermal properties of smouldering cigarettes and fabric/foam substrates. (4Q91)

3. Determine the effects of cigarette design parameters on their thermal properties. (4Q91)

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4. Determine whether correlations exist between ignition-propensity tests and the thermal properties of smouldering cigarettes and substrates. (2Q92)

5. Evaluate the technical feasibility of producing cigarettes with lower ignition-propensities with respect to a specified ignition test. (1992)

6. Implement the Center for Fire Research's ignition-propensity test and examine for correlations with our in-house tests. (1993, or sooner if available)

7. Determine the effects of cigarette thermal properties on the CFR IP test. (1993)

8. Evaluate the technical feasibility of producing cigarettes with lower ignition-propensities with respect to the CFR IP test. (1994)

Strategy 2. Computer Modelling

1. Develop a computer model of smouldering cigarettes which accounts for the effects of cigarette design parameters on cigarette heat flux; design and implement a companion experimental program to support the modelling effort and to validate results. (4Q91)

2. Develop a computer model of the temperature and oxygen distributions at the surface of fabric/foam substrates exposed to an external heat source which takes into account the properties of the materials, their treatment, the geometry of the test configuration, and the draft rates to which they are exposed. (1992)

3. Develop a computer model which predicts the probability of ignition of a smouldering cigarette on a fabric/foam substrate. (1992)

4. Exploit the model to determine the influences of cigarette design parameters on ignition propensities. (1993)

5. Obtain and evaluate the CFR's computer model of cigarette ignition propensities. (1993, or sooner if available)

6. Develop a computer model of a cigarette during puffing which accounts for the effects of cigarette design parameters on the weight of tobacco burned during a puff. (1994)

Strategy 3. Cigarette Design

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

1. Select acceptable design parameters for target cigarette models. (4Q91)

2. Develop low-density tobacco blends for new designs. (4Q91)

3. Fabricate, CTSD test, and subjectively evaluate low-MBR products; optimize subjectives through re-design where necessary. (2Q92)

4. Design, fabricate, and evaluate low-MBR versions of all PM cigarettes. (1993)

5. Evaluate commercial feasibility of manufacturing and selling cigarettes which demonstrate reduced ignition propensity with respect to the CFR IP test. (1995)

Strategy 4. New Technologies

1. Evaluate the effects of burn-control zones on the mass burn rates and ignition propensities of cigarettes in a given IP test. (On-going)

2. Evaluate the effects of burn-control zones on the thermal properties of cigarettes. (2Q92)

3. Investigate other technologies for improving cigarette fire-safety as we become aware of them. (On-going)

IMPACT

The findings of Project Tomorrow could have a major impact on our products. It is possible that we may need to: 1) alter the way we process tobacco; 2) increase significantly the amount of expanded material in our blends; 3) reduce the lengths and/or circumferences of cigarettes; 4) procure, or modify in-house, novel cigarette wrappers. Each of these modifications could require fairly drastic changes in the production of cigarettes. Our goals for 1991 include evaluating the technical and commercial feasibility of increasing cigarette fire safety and assessing the impact such modifications will have.

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

PROJECT TOMORROW
RESOURCES

INTERNAL	
1) Physical Research - IP testing; protocol development; modelling; wrapper studies; design	8.5
2) Product Development - cigarette design; materials procurement; design optimization; banded wrappers	5.0
3) Flavor Development - flavor systems; subjectives	2.0
4) Tobacco Processing & Fabrication - production of cigarettes	1.5
5) Cigarette Testing Services - CI evaluations;cigarette smoulder temperatures	1.5
6) Paper Technology - wrapper studies; material procurement	1.0
7) Leaf Department - blend design	1.0
8) Analytical - determinations of KOAc; fabric ignition-temperatures; tobacco heats of combustion; wrapper chalk levels	0.5
9) Engineering - process evaluation and implementation (banded wrappers & registration)	0.5
TOTAL	20.6

2021530089

Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

1992 OPERATIONAL PLAN
FILTER / NEW PRODUCT TECHNOLOGY

STRATEGIC GOAL NUMBER 1
SUPPORT OPERATIONS FIVE YEAR OBJECTIVES

QUALITY

Qualify new precoated porous plug wraps from one supplier for use on Lark products.	1st Qtr 92
Qualify new precoated porous plug wraps from second supplier for use on Lark products.	3rd Qtr 92
Support the implementation of an incoming carbon testing program.	Ongoing 92
Evaluate PVA menthol and dual pz booth mentholation techniques.	2nd Qtr 92
Evaluate application/impregnation of filler with menthol via liquid CO2.	1st Qtr 92
Evaluate Eastman's menthol-in-dope filters at target menthol delivery.	2nd Qtr 92

COST / PRODUCTIVITY

Remove additives from Calgon SCCW coal carbon.	1st Qtr 92
Implement single "PM Coconut Carbon" specification.	2nd Qtr 92
Conduct consumer test with PM coconut carbon as single carbon type for all PM USA products.	4th Qtr 92
Evaluate high activity wood-base carbons.	4th Qtr 92
Evaluate CA tow made with reduced bleach or unbleached cellulose.	2nd Qtr 92
Qualify natural-based glycerine type triacetin.	2nd Qtr 92

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STRATEGIC GOAL NUMBER 2

SUPPORT GROWTH OF THE BUSINESS - SHORT TERM

DOMESTIC

Support the production start-up of Merit Ultima.	1st Qtr 92
Conduct a mill run of Tela-type paper for use in Merit Ultima.	1st Qtr 92
Qualify a domestic source of Tela-type filter web material.	2nd Qtr 92
Support the filter requirements of R&D programs such as Marlboro Medium 100s, Marlboro Red, B&H KS, Parliament Lts. Menthol.	Ongoing 92
Evaluate recessed filters produced with tubes as an alternative to mouthpiece paper.	2nd Qtr 92
Design/build a laboratory laser perforator for production of custom ventilated prototypes.	3rd Qtr 92

EXPORT

Evaluate web samples of wood and wood+tobacco papers with carbon on Project 41 in PCC and dual filters.	1st Qtr 92
Qualify new precoated porous combining wrap for use on Lark Supers Lights tar reduction.	1st Qtr 92
Evaluate Baumgartner PSP filters with patterned hotmelt for use on Lark Super Lights tar reduction.	1st Qtr 92
Assist in providing in-house on-line laser perforation capability for Parliament-type filters.	2nd Qtr 92
Support installation of a plug-space-plug combiner for use in Semiworks.	1st Qtr 92
Support the filter requirements of PM International such as EEMA/EEC, Australia, Japan, Korea, etc.	Ongoing 92
Maintain close liaison with PM Europe R&D, PM Australia R&D and Intertaba.	Ongoing 92

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STRATEGIC GOAL NUMBER 3

ADDRESS CONSUMERS' DESIRES WITH NEW TECHNOLOGY-DRIVEN PRODUCTS

Support the filter requirements for Half-Nic / De-Nic, Project Lotus, Project Ambrosia, Low Tar/High Flavor.	Ongoing 92
Qualify a domestic source of Tela paper for Merit Ultima.	2nd Qtr 92
Conduct mill run of PM web.	1st Qtr 92
Evaluate consumer response to PM web filtered cigarettes.	2nd Qtr 92
Evaluate Courtaulds staple CA fibers and CA fibrids.	2nd Qtr 92
Conduct mill run of Courtaulds staple CA fibers and/or CA fibrids.	3rd Qtr 92
Support development of catalysts as filter additive for CO reduction.	4th Qtr 92
Determine feasibility of Courtaulds acetylated cellulose and deacetylated cellulose acetate web materials.	4th Qtr 92
Install 12" wide laboratory coater in Filter Development Lab.	1st Qtr 92
Evaluate additives coated on Tela paper in a paper core concentric filter.	2nd Qtr 92
Conduct joint development of heterofil filter materials with Celanese.	4th Qtr 92
Continue evaluation of Celanese CA web as it becomes available.	Ongoing 92
Evaluate ultra-low denier per filament tow items as they become available.	Ongoing 92
Evaluate novel vendor filters as they become available.	Ongoing 92
Conclude the qualification of triethyl citrate as a substitute for triacetin.	1st Qtr 92
Support Paper Technology with paper converting operations.	Ongoing 92
Provide and support innovative packaging concepts.	Ongoing 92

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STRATEGIC GOAL NUMBER 4

ADDRESS EXTERNAL REQUIREMENTS

Complete evaluation of strip applicator units (PM and MOLINS designs)	4th Qtr 92

STRATEGIC GOAL NUMBER 5

DEVELOP TECHNOLOGIES APPLICABLE TO FUTURE PRODUCTS AND PROCESSES

Support the Sensory Technology Program	Ongoing 92
Support the Tobacco Biochemistry Program	Ongoing 92
Support Project BETA with filtration technology.	Ongoing 92
Evaluate biodegradable filter and packaging materials as they become available.	Ongoing 92
Support in the design, installation, and testing of prototype equipment.	Ongoing 92

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PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: E. B. Sanders **Date:** October 1, 1991

From: F. P. Gullotta

Subject: Operational Plans for the Sensory Technology Program

Sensory Technology Program

The purpose of the Sensory Technology Program is to develop a fundamental understanding of the sensory characteristics of current and future products in order to improve their commercial success. The program's ***initial*** efforts will be directed toward developing: 1) a sensory enhancement/replacement for nicotine; 2) methods to optimize the flavor and impact of low tar/low nicotine products; and 3) a flavor delivery system for nonconventional smoking articles. Subsequent to accomplishing initial goals, we will embark upon additional aspects of the program.

In order to accomplish these goals, it will be necessary, over the next several years, to: 1) fund research laboratories that possess special abilities to address specific sensory issues of importance to P.M.; 2) network with sensory experts (e.g., Monell, Association for Chemoreception Sciences (AChemS), etc.) in order to keep abreast of current developments; 3) utilize the expertise of our overseas colleagues (i.e., INBIFO); 4) redirect our in-house resources toward program objectives; and, 5) hire additional experts in unrepresented or under-represented areas.

Since the objectives for the program are diverse in scope, each is listed separately, together with pertinent strategies and tactics.

Objective

To develop low alkaloid and low tar/low alkaloid cigarettes that have sensory characteristics superior to currently available products.

A. *Half-Nic (1992)*

Strategy #1

Develop an analytical approach to the measurement of the acid/base character of filler and smoke.

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Tactics

Investigate the historical application of standard techniques to measure the acid/base character of filler and smoke. (ARD - Complete December, 1991).

Explore other techniques for measuring the acid/base character of filler and smoke. (ARD - Complete March, 1992).

Devise experiments to test new and past methods of measuring the acid/base character of filler and smoke. (ARD - Complete June, 1992).

Strategy #2

Determine whether filler "pH" modifications of reduced alkaloid cigarettes will result in cigarettes with subjective properties comparable to higher alkaloid cigarettes.

Tactics

Conduct subjective and sensory evoked potential experiments using cigarettes made from filler which varies in "pH". (FTD, BCR - Complete January, 1992).

Based upon data obtained above, optimize filler modifications and cigarette construction to achieve subjective goals. (FTD - Complete April, 1992).

Strategy #3

Investigate the kinetic effects of nicotine at various "pH" levels.

Tactic

Conduct mechanistic studies to determine how "pH" alters the time course of observed responses. (INBIFO - Complete June, 1992).

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Strategy #4

Investigate the distribution of smoke particle size at different "pH" levels.

Tactic

Conduct experiments employing light extinction spectrometry to investigate the distribution of smoke particle size in "pH" modified filler. (PRD - Complete February, 1992).

Strategy #5

Determine the distribution and hydration state of nicotine in smoke at different "pH" levels.

Tactics

Develop and conduct vapor-liquid equilibrium (VLE) experiments to measure the concentration of free base nicotine in vapor at various "pH" levels. (PRD, Technology Assessment - Complete April, 1992).

Following the above, determine the species distribution of nicotine at various "pH" levels. (PRD - Complete July, 1992).

B. ***De-Nic (1994)***

Strategy

Develop a fundamental understanding of how nicotine affects sensory systems.

Tactics

Compile published information on the mechanisms by which nicotine affects chemosensory systems. (PED - Complete January, 1992).

Compile published information on how local events in the receptor environment (e.g., salivary pH) affect sensory responses to cigarettes. (PED - Complete January, 1992).

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Develop experimental models which can be used to screen for olfactory and trigeminal stimulants that have nicotine-like sensory effects. (Erlangen, FRG - Begin June, 1991 - Complete December, 1991).

Transfer experimental sensory methods developed in Erlangen, FRG to INBIFO. (INBIFO - January, 1992).

Evaluate test compounds (using above models at INBIFO) which have been determined to be potential sensory substitutes or modifiers for nicotine. (INBIFO - Begin 1992).

Conduct sensory evoked potential and subjective evaluations of promising and acceptable sensory substitutes for nicotine at P.M. Richmond. (BCR, FTD - As available).

Identify, negotiate with, and fund laboratories with pertinent expertise to develop receptor assays for olfactory and trigeminal systems. (BCR - Begin identification process during 3rd quarter of 1991).

C. ***Low Tar/High Flavor***

Strategy

Utilize the information gained from A and B to produce an acceptable low tar/high flavor product.

Objective

To develop a flavor delivery system for use in nonconventional smoking articles by 1995.

Strategy

Investigate the subjective and electrophysiological properties of nicotine in a simpler, more controllable fashion utilizing a nicotine aerosol system(s).

Tactics

Evaluate the analytical and sensory characteristics of various nicotine aerosol systems. (PRD, BCR - In Progress).

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Conduct subjective and sensory evoked potential evaluations of nicotine aerosols at various pH levels. (BCR, PRD - Complete Pilot Investigations October, 1991).

Perform subjective and sensory evoked potential studies on nicotine aerosols at various pH and menthol levels. (BCR, PRD - Complete March, 1992).

Conduct subjective and sensory evoked potential investigations of nicotine aerosols containing to-be-identified flavorants and sensory enhancers. (BCR, PRD - Begin 1992).

1992 Resource Allocations

DIVISION	PERSONNEL (man-years)
Biochemical Research	3.5
Chemical Research	1.0
Product Evaluation	1.0
Analytical Research	1.5
Physical Research	0.5
Flavor Technology	2.0
Technology Assessment	0.25

Technology Transfer

We anticipate that the Sensory Technology Program will yield information with direct product applications. Therefore, the most likely route of technology transfer would be to Flavor Technology for the evaluation of product candidates. From there, candidates would be transferred to PED for POL evaluations.

/mps

cc: R. Carchman
J. Charles

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R. Comes
K. Cox
R. Cox
C. Ellis
R. Ferguson
H. Grubbs
W. Hempfling
D. Heretick
K. Houghton
R. Kinser
C. Lilly
B. Losee
R. McCuen
J. Myracle
S. Nelson
H. Spielberg
J. Whidby
G. Yatrakis

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PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: Dr. E. B. Sanders

Date: November 6, 1991

From: G. N. Yatrakis

Subject: 1991-1992 Operational Plans - Project ART

Attached are the revised Project ART Operational Plans for the 4th Quarter 1991 through 1992.

If I can be of further assistance in this matter, please feel free to contact me.

G. N. Yatrakis

GNY:lgk

Attachment

cc: S. Clark
R. Cox
R. Heretick
J. Myracle
H. Spielberg

2021530100

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ART PROGRAM
1991-1992 OPERATIONAL PLAN - Revised
November 6, 1991

A. DE-NIC PROGRAM

I. Objective: **Develop a family of subjectively acceptable low tar, regular and menthol products from filler, which through supercritical CO_2 extraction, has a residual nicotine level of <0.1%.**

II. Strategies:

A. **Strategy I - Support the current test market in Phoenix.**

1. Provide subjective and analytical support for production of test market allocation.

   On-going

B. **Strategy II - Subjective Development/Incremental Change**

1. Flavor Technology work continues to evaluate new flavor systems which offer an improved subjective profile.

2. Evaluation of new and novel filter systems for an improved subjective profile is on-going.

   On-going

C. **Strategy III - Bermuda Hundred Production Facility Support**

Provide support on an as-needed or as-requested basis.

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D. **Strategy IV - Support of Low Tar/High Flavor Program**

Provide all necessary support for the Low Tar/High Flavor program.

As-needed

E. **Strategy V - Evaluate and develop process modifications for the utilization of ART process by-product tobaccos.**

Development of process modifications for use of post-ART stems continues. Testing in sheet materials involves substitutions for stem in RCB and RL's to determine acceptable levels. R&D has recommended that MPC stems be included in the RCB process at a 2% level replacing Burley stems (POL 3637). If implemented this would deplete the inventory in 10 months. Tests of CA stems in RCB replacing Burley stems are in progress. A recommendation was made to include DLF-3B into all expanded ET products at a rate of 4% before expansion. This was implemented at the MC and Cabarrus plants on August 5, 1991 and is expected to be complete during the 1st quarter of 1992.

Complete -- 4rd Qtr. 1991

B. HALF-NIC PROGRAM

I. Objective: **Through the use of PM proprietary technology (ART), develop families of products which deliver 50% of the nicotine of a conventional product at equal tar with comparable subjective response.**

II. Strategies:

A. **Strategy I - Tar/Nicotine Interaction Studies**

Three studies were initiated to determine subjectively the optimal nicotine delivery at a given tar level. In addition, a fourth study was expanded to include varying menthol deliveries in conjunction with varying tar and nicotine deliveries. All studies have been completed.

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

B. Strategy II - Half-Nic Development

The following approach is being pursued.

1. **Extraction and Processing** -- To determine which method of extraction and processing yields the most subjectively acceptable cigarette with the highest impact the following models will be produced for subjective comparisons:

    a. Blending of unextracted and fully extracted fillers with 35% 215-ET.

    b. Partial extraction of blend with 35% 215-ET.

    c. Partial extraction of total blend with 35% ET produced by DIET.

    d. Partial extraction of total blend with 35% ET produced by NET.

2. **Filler Additives, pH Adjustments** -- The most subjectively acceptable prototype chosen above will be used for the evaluation of various filler additives. At the present time, we anticipate evaluating 3 different additives for their effect on impact: Ammonium bicarbonate, Magnesium oxide and Calcium hydroxide.

3. **Filter Development** -- Using the information learned above, we will produce a "base model" for evaluation of filters, filter additives and alternate plasticizers. Filter systems will be chosen based on increases in impact and/or positive movement in subjective attributes.

4. **Cigarette Papers** -- Using subjective evaluations as a determining factor, various cigarette papers will be evaluated for an increase in impact and/or positive movement in subjective attributes while still maintaining the design criteria.

5. **Casing/Aftercut Development** -- Laboratory development of flavor systems will be ongoing throughout the cycle of development described above. Final flavor systems will be geared toward accentuating strength, tobacco flavor and developing a balanced product.

Prototype Development	1st Qtr. 1992
Internal Testing	2nd Qtr. 1992

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000

C. RESOURCE ALLOCATION ART PROGRAM

Flavor Technology Division	2.25
Chemical Research Division	0.50
Biochemical Research Division	1.50
Analytical Research Division	1.00
Cigarette Testing	0.50
Physical Research Division	0.20
Tobacco Processing and Fabrication	2.50
Total	8.45

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Source: https://www.industrydocuments.ucsf.edu/docs/hhkl0000